This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

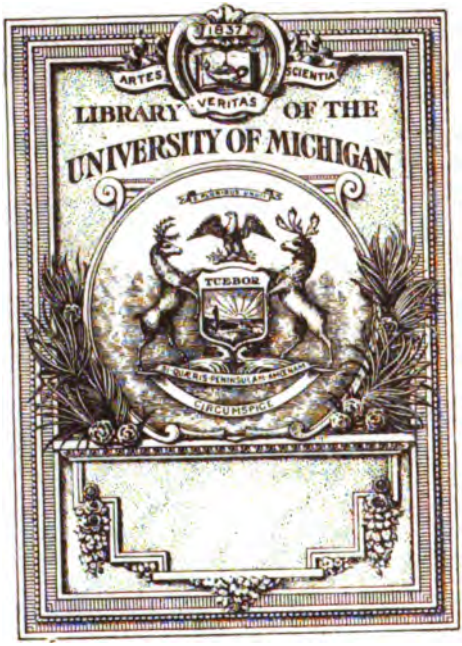
+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

B 506169 DUPL

Digitized by Google



Digitized by Google

HF
5686
.M3
W375

330

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

HIGHER ACCOUNTANCY

Principles and Practice

The texts listed on this page form the basic material for the LaSalle Higher Accountancy Course and Service. They are designed to meet the demand for efficient training in the more advanced branches of accountancy, preparatory to public or private practice or to passing the Certified Public Accountant examination as given by the several states.

Titles	*Authors*
ELEMENTS OF ACCOUNTING . . .	JOHN B. TANNER, C.P.A. *Wisconsin C. P. A. Board*
PRINCIPLES OF ACCOUNTING . . .	STEPHEN GILMAN, B.Sc., C.P.A. *LaSalle Extension University*
AUDITING AND COST ACCOUNTING . . .	WILLIAM ARTHUR CHASE, LL.M., C.P.A. *Consulting Accountant and Auditor*
BUSINESS LAW . . .	SAMUEL D. HIRSCHL, S.B., J.D. *Member of the Illinois Bar*
ORGANIZING A BUSINESS	MAURICE H. ROBINSON, Ph.D. *University of Illinois*
FACTORY ACCOUNTING	FRANK E. WERNER, C.P.A. *Consulting Cost Accountant*

LASALLE EXTENSION UNIVERSITY

Digitized by Google

FACTORY ACCOUNTING

FRANK E. WEBNER, C.P.A.
Factory Cost Specialist
Author of *Factory Costs*

La Salle Extension University
• Chicago •
1917

Digitized by Google

Copyright, 1917
LaSalle Extension University

ROBERT O. LAW CO.
PRINTERS AND BINDERS
CHICAGO, U. S. A.

Digitized by Google

PREFACE

That branch of accountancy practice which we may call "factory accounting," has assumed great importance during the last few years of rapid industrial evolution. Methods are constantly changing—technique is constantly improving. The large and complex industrial units require not only *accurate* accounting, but also *economical* accounting. It is with this thought in mind that the following pages have been written.

Factory accounting is a broader classification than cost accounting, although it comprehends cost accounting, of course. Any discussion of factory accounting will cover headings that the narrower, and more technical, subject of cost accounting must omit.

In writing this volume, the author has constantly borne in mind the complexity of this subject for the student and has endeavored to clarify the presentation by the liberal use of charts, graphs, and forms. In many cases forms have been filled in with illustrative figures, which are carried throughout the book, thus enabling the reader to observe the relationship existing between the several forms. It is hoped that this articulation will simplify the subject for the student.

The work has not been written solely for the beginner, however. Its principal claim for a place among the many splendid texts already published is its presentation of working methods and efficient technique. The subject of mechanical aids may not be ignored in any volume

Digitized by Google

which pretends to be more than a mere discussion of basic theory, since the entire routine of accounting practice has been changed during the past decade by the introduction of novel mechanical devices. We have, therefore, devoted liberal space to this phase of practical accounting for factories.

This book is presented for the consideration of accountants, manufacturers, and accounting students generally, with the belief that it will fill a real gap which has been observed in the existing literature on the subject.

Digitized by Google

CONTENTS

PART ONE—ORGANIZATION

I. ORGANIZATION—SYNTHESIS AND ANALYSIS
Production Prerequisites 1
Production Zones 4

II. ORGANIZATION—THE HUMAN ELEMENT
Importance of the Human Element..... 13
The Management 16
The Superintendent 19
The Foreman 20
The Workmen 21

III. ORGANIZATION—RESPONSIBILITY
Types of Organization..... 25
The Military Organization 25
The Functional Organization 26
The Committee Organization 27
Efficiency Requirements 27
Assigning Responsibilities 28

IV. ORGANIZATION CHARTS
Making Organization Charts..... 32
Charting Line Control 35
Charting Functional Control 38
Charting the Routine of an Order..... 39
Chart Details 42

PART TWO—CONTROLLING RECORDS

V. CONTROLLING ACCOUNTS
Definition of Controlling Accounts..... 46
Routine of Controlling Entries..... 51
Classification of Accounts..... 57

Digitized by Google

VI. Starting the General Exhibit
Mechanical Features 65
Opening the Exhibit 70
"Active Assets Group" Entries..... 72
"Passive Assets Group" Entries..... 75
"Various Assets Group" Entries..... 77
"Liabilities-Group" Entries 77

VII. Current Exhibit Entries
Order of Entries..... 80
Exchequer Accounts 81
Subsidiary Records 85
Types of Cross Entries..... 88
Summary of Entries..... 92
Interim Statements 97

VIII. Closing the General Exhibit
Order of Entries 102
Sales 102
Purchases—Material 105
Production Register 107
Suspense and Reserve Items..... 108
Expense 108
Summary of Entries..... 109
Closing Operations 113

IX. The Cash Account
Relationship to General Exhibit..... 115
Cash Receipts Sheet..... 122
Types of Cash Receipts Entries..... 125
Analytical Columns 130
Check Register Sheet..... 133
Types of Check Register Entries..... 135

X. Purchases
Antecedent Records 141
The Voucher System 142
The Purchase Analysis 146
Types of Entries..... 151
Summary of Entries..... 155

XI. Specific Order Production
Characteristic Features of Specific Order Plan. 158
Production Order Forms..... 162

Digitized by Google

Cost Sheets 164
The Production Register..... 164
Credits of the Production Register..... 170
Mechanical Aids 173
Summary of Entries 177

XII. PROCESS PRODUCTION
Characteristic Features of Process Production.. 181
Departmental Accounts 184
Standard Costs 187
Production Registers 191
Production Summaries 197

XIII. CONVERGENT METHODS
Definition 202
Machine-Hour and Sold-Hour Plans..... 203
The Point Method 207
The Sheet System 212
The Block System..... 214
The Budget System..... 217

PART THREE—INDUSTRIAL CLASSIFICATION

XIV. TYPES OF PRODUCTION
Classes of Production Industries..... 222
Synthetic Manufacturing 225
Analytic Manufacturing 227
Antecedent Assembling Preparation..... 229
Reciprocal Assembling Preparation..... 233

PART FOUR—PRODUCTION ELEMENTS

XV. MATERIAL
Physical Audits 238
Stock Ledger 244
Purchases 247
Automatic Records 253
Purchase Cards, Automatic..... 257
Finished Order Cards, Automatic..... 259
Material Issuance Cards, Automatic 261
Material Issuance Cards 263
Various Material Forms..... 267

Digitized by Google

XVI. LABOR
Time Registration 271
Time Reports 272
Using Time Reports..... 274
Nonproductive and Dead Time..... 276
Planning Rack 279
Mechanical Aids 283
Pay Summaries 288
Bonus Earnings 295

XVII. EXPENSE (OVERHEAD)
Importance of Proper Distribution..... 299
Uniformity of Practice..... 301
Expense Diffusion 302
The Labor-Percentage Plan 305
The Man-Hour Plan 310
The Sold-Hour Plan 312
The Machine-Hour Plan 313
The List-Percentage Plan 314
The Process Plan 315

XVIII. EXPENSE ANALYSIS
Analyzing Expense 317
Expense Summaries 319
Expense Analysis 320
Commercial Costs 324
Departmental Distribution of Expense..... 326
Expense Distribution 329
Administrative Costs 337
Indirect Producing Departments..... 338
Closing Entries 340

Digitized by Google

LIST OF LLUSTRATIONS

Inasmuch as the following named figures are largely used for examples with relation to one another and reference and comparison are to be made under the coördinated systems described, it is not planned that the various figures be intentionally placed at or near the text describing or referring to them. In many cases to locate them thus would be impossible without congestion and confusion of other forms, as cross references occur in too many places in the text. In the case of some of the forms of labor reports no specific, but only a general, mention is made in the text; hence the exact location of any particular figure is not vital so long as it is readily accessible and is convenient to scrutinize in conjunction with the text.

The figures are in topical sequence and for the most part appear on the left-hand pages with fairly even regularity but without reference to the adjoining text; this being a means of ready reference from any portion of the book—a self-indexing feature. Also, when once located, a more direct view may be had of the desired figure than possible from the right-hand page without more frequent page turning when used in connection with subsequent reading matter. With but few exceptions all references made in the text occur subsequent to the figures cited, and in the greater part of these exceptions the figures are placed at the right-hand side for convenient scrutiny.

By the intentional left or right insertion of "tipped in" forms it is possible for the reader to have unfolded within his range of vision both the records that are being considered. This makes it very similar to two separate books spread out for reference.

Fig. 1. Industrial Management Channels..... 2
Fig. 2. Essential Aids to the Master Mind..... 14
Fig. 3. Analogy to Teamwork..... 28
Fig. 4. Chart Illustrating Line Control in the Automobile Industry 30
Fig. 5. Chart Illustrating Functional Control in the Meat-Packing Industry 34

Digitized by Google

Fig. 6. Chart Illustrating the Routine of an Order for Crowding Engines in a Steam Shovel Works. 36
Fig. 7. Chart Showing the Relation Existing between a Business and Its Accounts..... 48
Fig. 8. Chart Showing the Routine of Controlling Entries 50
Fig. 9. Chart of Accounts..... 52
Fig. 10. Plan for Book Made Up of Long and Short Leaves 62
Fig. 11. General Exhibit, Opening Entries..... 64
Fig. 12. General Exhibit, Current Entries..... 66
Fig. 13. Adding Machine Strip of Interim Footings..... 72
Fig. 14. Daily Report—Master and Slip Sheets..... 74
Fig. 15. General Exhibit, Closing Entries..... 76
Fig. 16. Cash Receipts Sheet..... 78
Fig. 17. Check Register Sheet..... 80
Fig. 18. Record of Goods Ordered..... 84
Fig. 19. Purchase Analysis 86
Fig. 20. Production Register 88
Fig. 21. Diagram Showing Increase of Manufacturing Costs by Departments..... 92
Fig. 22. Diagram Showing Increase of Manufacturing Costs by Elements..... 96
Fig. 23. Summary of Machine Hours 98
Fig. 24. Summary of Yarn Production 104
Fig. 25. Summary of Textile Production 106
Fig. 26. Summary of Dye House Production..... 110
Fig. 27. Summary of Blast Furnace Production (Left-Hand Side of Sheet)..... 116
Fig. 28. Summary of Blast Furnace Production (Right-Hand Side of Sheet)..... 117
Fig. 29. Peak Sheet under Point System..... 120
Fig. 30. Departmental Block Sheet..... 124
Fig. 31. Chart Showing Various Classes of Production... 128
Fig. 32. Stock Ledger Card..... 130
Fig. 33. Purchase Requisition 136
Fig. 34. Purchase Order 138
Fig. 35. Punched Card for Purchases 144
Fig. 36. Punched Card for Finished Orders 146
Fig. 37. Punched Card for Material Issuances 150
Fig. 38. Material Card 152
Fig. 39. Excess Material Card..... 156
Fig. 40. Semifinished Goods Card..... 160
Fig. 41. Order Tag with Material Requisition Coupon.... 162
Fig. 42. Order Tag with Material Report Coupon..... 166

Digitized by Google

Fig. 43. Report Form for Material Used..... 169
Fig. 44. Bill of Material..... 174
Fig. 45. Storekeeper's Receipt for Finished Parts (Upper Figure) 178
Fig. 46. Summary of Material Issuances (Lower Figure). 178
Fig. 47. Adding Machine Summary of Material Costs.... 182
Fig. 48. Stock Report 185
Fig. 49. Departmental Inventory 190
Fig. 50. Equipment Inventory 194
Fig. 51. Defective Work Report..... 196
Fig. 52. Time Work on Specific Order..... 200
Fig. 53. In and Out Card. Report of Work Done..... 204
Fig. 54. Start and Stop Card. One Job 206
Fig. 55. Start and Stop Card. Ten Jobs 208
Fig. 56. Start and Stop Card. Written Description.... 214
Fig. 57. Start and Stop Card. Outside Repair Job..... 216
Fig. 58. Time Stamp Card. One Job 219
Fig. 59. Time Stamp Card. Ten Jobs 222
Fig. 60. Elapsed Time Impression. Machine Shop 224
Fig. 61. Elapsed Time Impression. Machine and Operator 228
Fig. 62. Elapsed Time Impression. Press Room 232
Fig. 63. Departmental Report Form for Reverse of Any Clock Card 234
Fig. 64. Start and Stop Coupons for Specific Jobs by One Operative during One Day..... 240
Fig. 65. Start and Stop Coupons for Orders Processed by One Operative during One Day..... 242
Fig. 66. Start and Stop Coupons for Various Operations on One Specific Order. Time Work..... 246
Fig. 67. Piecework Coupons for Various Operations on One Dozen Garments. Standard Production..... 248
Fig. 68. Elapsed Time Impression and Perforation..... 252
Fig. 69. Labor Card Punched from Separate Time Records 256
Fig. 70. Job Ticket for One Day. Time Written..... 260
Fig. 71. Job Ticket for One Day. Time Indicated in Quarter Hours 264
Fig. 72. Daily Time Report. Time Indicated by Time Unit Numbers (Six Minutes)..... 268
Fig. 73. Job Ticket for Week. Time Indicated..... 277
Fig. 74. Daily Time Report. Time Written..... 279
Fig. 75. Timekeeper's Sheet (By Processes)..... 281
Fig. 76. Piecework Record for Premium Docks..... 282
Fig. 77. Planning Rack 285
Fig. 78. Card Pocket 287

Digitized by Google

Fig. 79. Indicator Cards 287
Fig. 80. Adding Machine Sheet for Daily Time Reports.. 293
Fig. 81. Pay Roll Master Sheet..... 300
Fig. 82. Pay Roll Form. Sold-Hour and Machine-Hour Plans 309
Fig. 83. Expense Analysis 328
Fig. 84. Expense Distribution 340

Digitized by Google

FACTORY ACCOUNTING

PART ONE—ORGANIZATION

CHAPTER I

ORGANIZATION—SYNTHESIS AND ANALYSIS

Production Prerequisites

Production is the process of creating that which is formed or produced by labor or by mental application, as the products of manufacture, of commerce, or of art. Commercial production primarily consists in converting assets from one state or condition to other states or conditions and usually involves many steps or grades, each an important part of a perfect whole.

An old adage cites that it takes money to make money. It is as true to-day as it was in other years, albeit the proportions of profit to investment to-day are, broadly speaking, larger than they were in times gone by. Modern machinery, intelligently used, makes this possible. Any manufacturing business having funds permanently or temporarily invested requires the further expenditure of money to keep the business afloat, as there can be no such condition as standing still; reflex action, involving dry rot, would immediately set in.

Material, labor, and manufacturing expense (very com-

Digitized by Google

monly known as "overhead" or "burden") are the three constituent elements of production. All of these are equally important, for no two can be combined without the aid of the third. In other words, there can be no commercial production without bringing into combination these three elements, and the ultimate purpose of this blending operation is usually a final exchange into the asset with which the process ordinarily starts, i. e., cash (or its equivalent). If the business is successful, the amount of cash realized on the completion of the cycle is greater than the amount of cash originally invested (representing the "know how" of the master mind); but in any stage of the process the values on hand are merely cash in another form and should be guarded and accounted for with the same jealous care. As a matter of fact, in modern factories each of the three production elements is as closely checked as cash, and the advantage of such a condition is great. When a close record is kept, the exact status of all asset accounts and the exact condition of all material on hand can be ascertained without leaving the office. This permits of the short cost period so essential to accurate cost finding. It also gives a knowledge and close touch of the business that can be secured in no other way. In short, an effective modern system of factory accounting enables the factory to be run from the office—a wonderful advantage under any circumstances, and particularly so when a business is under stress of competition.

Primarily there is no necessary relation between the three physical elements of cost. A very large amount of labor may be expended upon material of insignificant value, as is the case in the manufacture of many instruments of precision, where the material may cost but a few cents, while the labor and manufacturing

Digitized by Google

Digitized by Google

Digitized by Google

expense involved amount to many dollars. On the other hand, the material may be very costly, while the labor and manufacturing expense involved are of small comparative cost, as in the manufacture of plain gold rings.

Factory accounting analyzes costs, operation by operation, and supplies the manager with invaluable data from which to work in *reducing* costs. Its effectiveness does not stop here. If it is decided to start a campaign to increase the efficiency of the factory force and to eliminate the inefficient men, then the individual records of the men will be secured from the cost records. In large bodies of workmen a steady and intelligent campaign along these lines will work wonders.

An efficient factory accounting system will operate automatically to reduce costs, from the mere fact that under its close supervision and its full exposure of waste and inefficiency, employees work better and are more careful of material and mechanisms. Beyond this it will, as time proceeds, bring to the attention of the management many conditions in the establishment not previously considered, or perhaps not known at all.

An adequate factory accounting system also indicates fluctuations in production costs and shows just where these variations take their rise, resulting in more uniform production prices and a greater general economy of production, finding expression at the completion of the cycle in large dividends.

When a producer stakes his chances of loss or profit upon a guess as to what his goods cost, he becomes a gambler. He jeopardizes not only his own interests, but also the interests of his competitors, who must strive to meet his frequently impossible prices, and the interests of the trade at large, which he is helping to demor-

Digitized by Google

alize by his "unfair prices." When he fails, the whole industrial fabric is affected by both the act and the record of failure, and he not infrequently carries down with him other institutions, entailing heavy loss upon hundreds and even thousands of people who did not even know that their interests were related to his.

Production Zones

Figure 1, opposite page 3, is an allegorical or symbolical chart demonstrating visually the advancement of production elements through the various phases or zones involved. An aphorism recites: "He of least understanding taunts and sneers the most," and it seems timely to preface the description of the chart with the statement that it is not intended as an exhibit of jointless pipe, aerially poised tanks, and other seemingly anomalous physical conditions. Merely a front elevation is shown with no accompanying side elevation or plan; hence relative capacities of tanks, pipes, etc., are not intended to be determined from this chart.

Zone 1: Liquid Assets.—A prime prerequisite of any business undertaking is cash, or its equivalent in sufficient quantity and fluent condition to admit of quick conversion. This is represented in the chart by the tank labeled "Exchequer."

Zone 2: Executive Control.—The end and aim of all business enterprise is profit, but the degree of success of any business is gauged by the acumen of its manager, together with his ability to get at facts concerning his affairs whereby to shape his course. A river can rise no higher than its source, nor can an executive, on occasion, rise higher than his source of information. Any attempts to do so are but flights into the face of

Digitized by Google

providence—conjectures—guesses. There can be no effective organization and system of any high degree of efficiency without accurate, adequate, and properly used records. Statistics show that nine out of every ten business failures are the direct result of ignorance of the real conditions, which would have been revealed by a proper accounting system. Accurate and efficient records are quite as important to a business as are charts and compass to a ship at sea, showing the location of the shoals which menace disaster, indicating the channels in which the water is deep and safe, and pointing surely and steadily the course to be followed.

In any large and broadly successful business, the accounting department is looked upon as one of the most important factors of success, and the larger and more successful the operations of such a business, the greater pains to maintain an adequate and effective system of accounts.

In the chart the executive is shown in instant control of the assets of the enterprise, guided by compilations of facts conveyed to him from the accounting department of the business. Within his reach is the valve-stem controlling the profits or dividends typified by "barrels of money," which in the majority of cases is the happy result of closely watched and intelligently used cost data.

Zone 3: Investment.—For a business not guided by a full and complete knowledge of its affairs, the prospective profits may fitly be characterized as "will of the wisp." In this chart, however, a full and complete knowledge is represented, and the prospective profits are indicated by a balloon in leash, the continued captivity of which rests solely with the pressure maintained by the sales department (Zone 7).

Digitized by Google

As so-called "fixed assets" are not regularly subject to increment, the tanks representing such are shown in the chart with lids down; they are, however, subject to the will of the management by means of rods and cranks connecting directly with the controlling levers for executive control (Zone 2).

The "stores and stocks" tank is next to the "goods in process" tank, with interconnecting tubes representing the passing of material stores into process and the passing of finished parts and finished product from process into stocks. This latter conversion of assets is not further depicted, inasmuch as all lines of production (such as this chart essays to cover broadly) do not carry finished or partially finished stocks made up in advance. The tank representing goods in process is shown as being closed, which in this case would represent a normal volume of work in process at all times and hence a fairly steady amount of values invested, subject to the will of the management. The tank representing stores is shown as being open to receive the continual flow of replenishing investment in material and supplies that is necessary to any growing manufacturing industry. There is in this character of investment a fairly steady amount of values involved, subject to a constant withdrawal for use in goods in process; this use is pictured by the pipe from the stores tank to a tank representing material and supplies (Zone 5). The latter, together with the tank representing direct labor (Zone 5), receives a constant replenishing flow of investment. Inasmuch as some lines of production put all material through stores before putting it into process and other lines pass the great bulk of material purchases immediately into process, it is quite impossible to represent closely all lines of production in this one illustration. In the case of

Digitized by Google

direct labor there is not such a variance in principle, although there is in detail.

In the case of investment in prospective profits there is no let-up on the flow of expenditures; this flow, however, is in the nature of advertising and selling costs of various kinds, and the receiving tank (Zone 4) is shown as a sales department burden. It is quite likely that some executives would advocate showing prospective profits as a tank in Zone 3. There is no analogy, however, as physically land and buildings have an intrinsic value under any condition, whereas prospective profit (ordinarily known as "goodwill") is too closely involved and dependent upon the tank (Zone 6) characterized as "profit developer" to be other than a captive balloon, the safe anchorage of which is solely dependent upon the efficiency of the sales department.

Zone 4: Overhead.—The manufacturing expense items are shown as passing from their respective tanks into Zone 5 immediately below to be analyzed and properly segregated over the various production departments. Chapters XVII and XVIII treat this phase more fully.

Commercial costs are depicted as passing from the tank on down to Zone 7 to be absorbed into loss and gain.

Zone 5: Cost Elements.—Departmental Burden.—Of the three elements of production cost, expense is unquestionably the most difficult to determine accurately, and even when this is done, the end in view is but half attained. The expense burden, or overhead, as determined is still to be applied to the manufactured product, so that it will in connection with the charge of labor and material disclose the true cost of production.

The important part expense plays in production cost

Digitized by Google

and the necessity for its proper distribution are not always recognized. The cost of labor and material stands out clearly. Usually such costs are closely coupled with specific order numbers, or with mass production processes, or with departmental costs, and are brought into further prominence by clearly defined payments at fixed times. Factory overhead, on the other hand, made up from many varying sources, not clearly seen, indirect in its application and scattered as to time of payment, is very much more difficult of determination and does not seem so worthy of consideration. Yet the weight of the overhead expense, or burden, is in many cases the factor that decides the success or failure of an enterprise. These overhead charges frequently amount to 100 per cent, 125 per cent, and even much more, of the direct wages. It is therefore often really more important that they should be correct than that the actual labor cost should be correct. Chapters XVII and XVIII treat fully on expense distribution over departments.

Zone 5: Cost Elements—Material.—When a modern plan of factory accounting is in use, an accurate record of the issuance of material is extremely important and the physical issuance should be under the immediate supervision of trained clerks. Chapter XV treats fully on this element.

Zone 5: Cost Elements—Direct Labor.—The importance of true time reports cannot be emphasized too strongly, for without them accurate cost finding is impossible. If less time is reported on some particular job than was actually consumed, then some other job has to bear the burden, and the findings of the factory accounting system are false and misleading.

Time reports vary widely in form and method of use.

Digitized by Google

The most efficient form of time report under any condition is one on which both the beginning and the finishing time are recorded by a time-recording device. This records the facts and precludes the falsification and evasion possible under almost any other conditions.

Chapter XVI deals fully with the various factors entering into the proper allocation of direct labor charges.

Zone 6: Product.—The first step in the manufacture of an article or product under a modern factory accounting system is the issuance of a production or assembling order, which is a general authorization from the master mind to those concerned to proceed with the manufacture indicated. This they do in accordance with the formalities and routine of the particular factory.

In the chart the works manager is depicted as a well-informed official, fully equipped to direct the efforts of his forces. The flow of costs of the three production elements shows on gauges accessible to him, and such flow is controlled by valves. He is surrounded by various tests of accuracy and means for eliminating unnecessary costs. The "cost bug," a colloquialism typifying the time and cost department, is assiduously searching through a medium for facts concerning goods in process, the records of these facts being typified by the cabinet and book close to the works manager's hand and representing past performance and the various ramifications of cost data.

The tank on the right hand, labeled "Profit Developer," represents brain product—not of the sales manager alone, but of the entire force of officials under one of the rules of efficiency; i. e., all officials work toward the same end. For the sales manager to do effective and

Digitized by Google

enduring work, the product must be right and at a production cost that admits of a profit at prices interesting to the possible buyer.

Zone 7: Loss and Gain.—Efficiency or scientific management is not a thing reserved for the comprehension of the elect. It is not a thing to take fright at; it is, on the contrary, only common sense applied to everyday affairs, the doing of a thing in a better, a quicker, and a more economical way than at present, the doing of a thing in the right way, the easy, the adept, the direct, and the natural way, rather than the careless, the slovenly, the wrong, and the roundabout way.

Efficiency has a widespread application and may be practiced generally by everyone in some form or another. Efficiency is the duty not only of every man to himself, but of every man to his neighbor, and most certainly of every manager to his business. It is the slogan that means prosperity—a watchword of honest effort and well-directed energy.

If a hundred men have a certain work to perform week in and week out, a few of them will presently be found to execute the work with greater ease and dispatch than the rest, and of these few, one will be found who, with less expenditure of energy and time than any of the others, accomplishes the work better. This is as true of accounting procedures as of direct production. That man is the efficient man; he has evolved the efficient method. That method should be made known to all and followed by all, and a high degree of efficiency will be the result for all. Those who are willing to learn will progress, but those who cling to their old methods and refuse to learn will fail.

Every possible improvement should be known and con-

Digitized by Google

sidered, instead of being ignored until it forces its way into use. Merit should be sought out wherever it may be found, instead of being choked off and forced to fight its, perhaps half-starved, way to the front.

As long as a manager is satisfied that he has nothing more to learn about his business, he will learn nothing more, but when he realizes that he is not yet the master of the accumulated knowledge of the world on his subject, he will progress. Once in the swing and step of progress, he can readily keep abreast of his competitors and apply to his own problems the results which have been and are constantly being achieved by others. We are told that next to his own affairs a good manager should know what his competitor is doing. This bespeaks for the manager a knowledge of his own affairs, which is a requisite of continued success in modern manufacturing and merchandising and has a very direct influence upon the Loss and Gain Account.

In the chart, Figure 1, the functions of the sales management are clearly visualized. From a tank in Zone 6 comes a stream typifying finished product, and similarly from a tank in Zone 4 comes a stream typifying commercial costs. There is a pressure gauge on each of these pipes to indicate to the sales manager just what he may expect, and also each pipe is equipped with a valve which is to indicate that the sales manager can, over each, exert more or less control.

From a tank in Zone 6 comes a pipe with neither gauge nor valve. This typifies "profit developer" or "know how," and every ounce that can be drained from that tank is allowed to pour without let or hinderance; hence no valve is needed. A gauge is, in this connection, not needed for high pressure; the executive in

Digitized by Google

Zone 2 can telephone the sales manager of any *low*-pressure condition.

The flow from these various pipes would soon have the sales manager entirely submerged if he did not pump out a sufficient volume to protect himself and to maintain at least the minimum pressure in the pipe running upward to the tank in Zone 1 to keep the gauge (Zone 4) from dropping and thus snipping the cord and freeing the captive balloon in Zone 3.

The present volume deals directly with the details involved in the accounting processes here represented by the recording gauges. The accounting results are conveyed to the management perhaps pneumatically as here shown, perhaps otherwise; in any case the cycle is completed.

Digitized by Google

CHAPTER II

ORGANIZATION—THE HUMAN ELEMENT

Importance of the Human Element

The ultimate end and aim of all commercial production is profit in one form or another. Profit is the excess of revenue over costs; without profit there can be no commercial success. There is no royal road to success, and to him who scrutinizes the record, step by step, the course of financial and engineering successes, it becomes clearly evident that every man is the architect of his own personally acquired fortune.

Success is not accidental, although seemingly accidental combinations may at times bring about conditions which, of necessity, are prerequisite to success and thus hasten the achievement of the desired end. The greatest successes are achieved by those men who are endowed by nature with the happy faculty of picking able lieutenants to perform or oversee the details.

Business success depends upon the accurate grading and blending of various elements. The three physical elements, material, labor, and expense, are prerequisite; yet, even more important than these, is the human element. It is by far the most perplexing to reconcile and adjust. From end to end of the industrial fabric weakness, deficiency, prejudice, and selfishness appear at

Digitized by Google

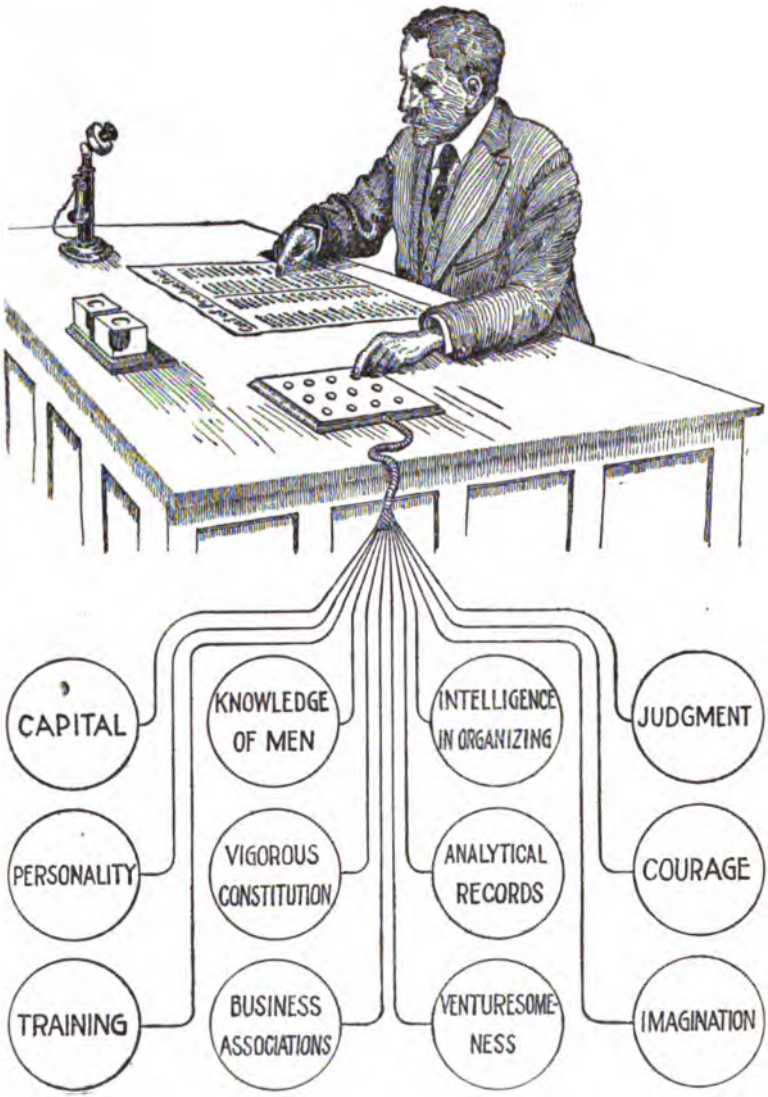


Fig. 2.—Essential Aids to the Master Mind

Digitized by Google

inopportune times and under disconcerting conditions, developing friction and causing unexpected and troublesome complexities. Even with these formidable foes to success, the executive head of a business is expected at all times to keep his temper, preserve intact the capital invested, endure the fiercest competition, bear inevitable losses and crosses, and yet show a net profit at the end of the year.

The control of human energy is the objective point of successful management. A business is not made successful, it is not made big, it is not made at all, by mere material and machinery and buildings and tools or by anything tangible. Big men make a business big, and the qualities that make men big are intangible. Mere hard work will not bring success. There must be behind the work an ability that will make it accomplish something. And that ability must include a fitting respect for the man-power without which any system or management is an inert machine.

Men as a whole prefer to sell their time rather than their labor and to perform in that time the amount of labor they consider proper for the pay received. In other words, they prefer to work by the day and be themselves the judges of the amount of work they shall do in that day. While this is true, a very large number of them are willing to do any reasonable amount of work the employer may specify in that time, provided only they are shown how it can be done and are paid substantial additional amounts of money for doing it.

While subject to human frailties, nevertheless the great majority of workmen are to be influenced by clear, logical reasoning. They are, at heart, faithful. This is important, for every machine in a factory, every part of

Digitized by Google

the product, every sale made, every dollar of investment depends for its efficiency on a man. Contented men give a better result than mere men. Enthusiastic men give a better result than merely contented men. Men with pride in their work, with enthusiasm in their blood, and with loyalty in their hearts can accomplish the seemingly impossible.

The Management

Accounting is a vital element of business. Progressive management is a most potent factor of continued success in modern manufacturing. Conditions in the industrial world are constantly and, at times, rapidly changing, and unless factory conditions keep pace with the changing requirements, the relegation of the non-progressive factory to the industrial scrap heap is but a matter of time.

The advantages of a proper system of production accounting records are so direct and so obvious that objections on the part of the management would hardly be expected. As a matter of fact, hesitancy, procrastination, and objection commonly characterize the managerial heads when the subject of factory accounting is broached. To these the very word "system" implies something mysterious—something big and unwieldy and certainly something expensive. The idea of "organization" is not coördinate with thoughts of economical management. To these the idea of "system" is indissolubly linked with "red tape." "System" to them means additions to their clerical force, and additions to their clerical force mean additional dollars spent upon "nonproducers." They will refuse to admit the advisability of systems sufficient to care for their heavy factory

Digitized by Google

interests, and yet they have sufficient intelligence to keep up their general accounting system.

The objections urged against the introduction of closer production accounting plans are many. To the advocate of accounting improvements the manufacturer will declare in good faith that he is in close personal touch with every detail of his business, particularly with the cost of his product, and that the installation of a complete plan of records would be a superfluous elaboration. The observance of any logical routine in the handling of business is so repugnant to the training and style of some business men that they take refuge in the absurdity that all "system" is red tape. That this attitude on the part of business men is too general and often fatal, is generally conceded by those whose occupations, such as bankers, lawyers, judges, professional accountants, referees in bankruptcy, etc., bring them into close contact with the facts and figures side of business troubles or failures.

Another manufacturer will say that he contracts for his raw material on an annual basis and that for this reason prices of material do not fluctuate with him; that he employs his shophands on a piecework basis entirely and therefore knows his labor costs to the fourth decimal; and that his overhead is quite readily distributed over his product at a given percentage of labor cost.

Yet another manufacturer will say that his records are kept so that his costs for material, labor, and expenses in each department are clearly shown and that accurate estimates can therefore be made of the cost of any individual article or product *when these are needed.*

Yet again, a manufacturer taking a less vulnerable position declares that he has a specialty and enjoys such

Digitized by Google

exceptionally favorable conditions that competition is practically eliminated; that he knows he is making money and is satisfied with results as they are; and that the estimation of costs on individual articles is of no interest to him.

And so the argument runs. Human nature prompts the manager to combat any intimation that his plans or arrangements are not of the best, and yet in the inner councils of his staff puzzling losses, unexplained shortcomings, and profits that should have been made but were not, are constantly up for perplexed discussion—conditions which should be an all-sufficient reason for better accounting or for a more intelligent application of that already in use.

The average business executive fails to get more than a small part of the vital facts and statistics that he should have to control the activities of a business intelligently. The desire to avoid the expense of the necessary system, that will bring such vital statistics to the executive desk, has created this condition. Even where managerial inertness does not take the form of open opposition to the introduction of a cost system, it may yet be fatal because of its reluctant adoption of modern methods, because of its strict adherence to the tenets of the stone-blind "practical" man who never does anything unless it is mouldy with precedent.

The old idea was to keep one's methods a secret, on the general assumption that the things hidden from a competitor were the things that made a concern big and successful. This fallacy has happily to a large extent been broken down, and to-day manufacturers of similar commodities get together in stated conventions for the discussion of uniformity in cost accounting plans.

Digitized by Google

Among such are printers, lithographers, bankers, manufacturers of machine tools, furniture, elevators, paper boxes, envelopes, cut glass, shoes, etc.

A cost system once installed naturally does not encounter the active opposition of the management, but it is frequently injured almost as seriously by captious criticism or an almost hostile indifference. This, when present, coming almost entirely from the older generation, is an absolutely indefensible position. The installation of a factory accounting plan should not be authorized until the management is either convinced of its merits or willing to give it a fair trial. Once decided upon, there should be no hindrance and no wavering or turning from the task. The installation of a new system in a large industrial plant involving even slight changes in the habits and practices of hundreds of men is, as already suggested, bound to encounter more or less serious opposition—an opposition that cannot as a rule be overcome successfully save with the encouragement, support, and active assistance of those in control. As a matter of good practice and good business, the new system should have the warmest and heartiest support of every official; particularly should this support be warmly active in the beginning and until the successful operation of the new system has become a mere matter of routine.

The Superintendent

In the thoroughly modern shop the superintendent is conversant with every process and with every part of every operation. This involves a knowledge of the cost of each process or of each operation and in turn each element or section and in turn the cost of the completed

Digitized by Google

whole. It is the duty of the superintendent to keep a general supervision in its entirety, increasing efficiency and decreasing costs wherever possible.

With such duties the full coöperation of the superintendent and of his immediate subordinates is essential to the efficiency of any comprehensive factory accounting plan. If the superintendent is inclined to oppose the plan, it is likely to prove a failure. If he is lukewarm, the difficulties of successful installation and operation are great. If, on the other hand, he is enthusiastic and determined to produce the best possible results, the success of a well-adapted system of cost finding is practically assured.

Many good men aim to serve faithfully the cause of the banner under which they are enlisted, yet along certain lines outside this beaten path are not gifted with inventive genius and hesitate to take the initiative. Some are so reluctant to accept innovations that at times pressure must be brought to bear upon them.

The superintendent's support should not be hard to enlist. If he is capable, he will readily appreciate the value of an efficient system of factory accounting. If in any case the superintendent is found to be opposed to the introduction of improved methods and his opposition cannot be overcome, the installation either would better be deferred to a more favorable season, or would better be preceded by the employment of a new and more modern superintendent.

The Foreman

It is a foregone conclusion that both foreman and workmen will, to some extent, resist all attempts to secure accurate data concerning labor operations. A

Digitized by Google

good factory accounting system properly operated will tend to prevent shirking, reduce dead time, and increase efficiency, but in doing this it will demand greater effort and more steady application on the part of the men. It also necessitates a closer supervision of both men and machines and a general "drawing-in" of the industrial process all around.

Because of this and from a general apprehension that the new order of things may in some way work to their disadvantage, the men will almost inevitably oppose the installation of an efficient factory accounting plan. In this the foreman is apt to side with the men. He may really wish to advance the interests of the management, but his heart is with the men and especially so where he has served his time in subordinate capacities in the particular department over which he now holds sway.

If the whole matter is presented to the foreman properly and through him to the men, the support of both should be secured. If it cannot, the condition is one which must be treated individually. In several cases which have come under the author's personal observation, the dismissal of foremen, otherwise seemingly good, who opposed the installation of a cost system has had a very salutary effect. A foreman is not really good if he persists in working at cross purposes with the management.

The Workmen

The typical patient, plodding workman has not many aerial flights of thought while plying his trade. He may have a veritable storehouse of technical knowledge and a wide range of usefulness in his particular line and yet have no genius further than to apply to a new purpose

Digitized by Google

some movement or process he has seen demonstrated. He is known as a "practical" man; many such develop into foremen, and good foremen where other qualifications are present.

The theorist and the inventor have conceptions which they want realized; the function of the practical man is to carry out the plan of the theorist. Each needs the other, for it is an almost infallible rule that the so-called "practical" man is prone to measure any plans by immediate results and fails to discern the greater and broader results which the theorist has in mind.

It oftentimes seems a hopeless task for the workman to comprehend the aim and object of the systemizer's efforts. Quite generally the practical man is lamentably wanting in the very point where the other man excels—the organizing faculty. Take a typical workman from the bench where he has never, so to speak, had to look beyond his nose, and place him in a position of responsibility and command, and he is completely at sea. Unless he be endowed with exceptional qualifications, he turns out hopelessly slattern or ineffectual, or a martinet, or a bully; he has slight sense of perspective and stickles absurdly over little points, while he lets the great ones go; and it is almost impossible for him to look before and after as he should do or to bring to a proper focus a whole field of consideration.

The successful installation of a factory accounting system depends largely upon the proper frame of mind of the workmen. On the surface it might appear that the employees in a factory have nothing to do but to follow instructions. This is true, but they will, if the spirit of insubordination is abroad, follow instructions with such density of apprehension as to make the general plan

Digitized by Google

of factory records—no matter how well it may have been devised—burdensome, ineffective, and costly. Employees are never glad to see changes of routine. They do not understand them, and being ignorant of the purpose, they generally imagine they mean the worst results to themselves.

The workmen must be carefully considered and have brought to bear upon them all the managing ability which has for its aim and purpose the inculcation of the right ideals of work, faith in the business, and enthusiasm for its prosperity. If the men can be shown that any proposed new factory accounting plan is not hostile to them, if they can be induced to give it their cheerful support, to make their reports promptly and correctly, and to accept suggestions for economy of time and material without ill-feeling, it makes strongly for the success of the plan and goes far to increase its ultimate effectiveness and value.

A comprehensive factory accounting plan if properly used gives a close and intelligent comparison of individual effort and leads to the proper classification of employees. This is obviously to the advantage of the employees and should be appreciated by them. These comparative records, however, act in themselves to stimulate the men and eliminate much unnecessary wastage of time, and this more immediately apparent feature does not appeal to the average employee. On the contrary, it is a strong argument in the minds of many workmen against anything tinctured with system.

This opposition should, however, be easily removed if the men have confidence in the management. Greater productive efficiency of labor should be advantageous to both employer and employee, for increase in efficiency

Digitized by Google

makes possible the payment of high wages, and it may be added that without efficient labor, high wages cannot be paid indefinitely, for every wasteful operation, every mistake, every useless move has to be paid for by somebody, and in the long run the workman has to bear his share.

Digitized by Google

CHAPTER III

ORGANIZATION—RESPONSIBILITY

Types of Organization

In modern production there are three recognized types of industrial organization, namely, the military, the functional, and the committee. These may be known by names of similar nature meaning the same thing.

The Military Organization

The military system is perhaps the oldest and until recent years was the only plan practiced. Under this scheme, all power and authority originates with one executive head, who is held responsible for everything that is done in any part of the division under his control. Every officer in each division or subdivision is held responsible for all that happens within his province. If a foreman has charge of a department and runs behind in his orders, is extravagant in the consumption of supplies or power, or is deficient in the quality of work turned out, he alone is responsible. He is expected to look after the details and accomplish results; he must keep his men at work, must see that machines are in good working order, and must be able to judge the fitness of his men. He must detect inaccuracies, determine the causes, and apply the remedies. In short, he must be a thorough all-around man to fill his place properly. This is spoken of as "line control."

Digitized by Google

The Functional Organization

In military line control the commander-in-chief does not discuss the details of all his far-reaching plans with his line officers. Under the military staff principle special officers are appointed to furnish trained guidance along special lines. The arrangement of all interlocking details is necessary to successful campaigns, and success depends upon the coördinated total of all their efforts. Industry avails itself of the expert knowledge of trained men and we, therefore, have the counterpart of military staff control in what is called "functional control."

The functional system of organization consists in dividing the work of management so that each subordinate officer shall have as few functions as possible to perform. The scheme applies the "division of effort" theory to the management. The shop workmen, according to this plan, work under the direction of several foremen instead of but one. In a machine shop under this plan, a gang boss has charge of preparing the work up to the time the piece is set in the machine. He shows his workmen how to set the work on the machine in the quickest time possible and in the best way. The speed boss provides proper tools and sees that the cuts are correctly started and at the maximum speed. The inspector is responsible for the quality of the work, and both workmen and speed boss must finish work to suit him. The repair boss sees to it that each machine is kept in clean, oiled, and perfect working condition. In addition to these four shop overseers, the workmen come into contact with the representatives of the planning department, whose function is to relieve the shop foremen of all thought of how the work should be arranged and distributed to the machines.

Digitized by Google

The Committee Organization

The committee system of control involves the formation or appointment of functional committees made up of the best talent available to cover each one of the several functions. To weld these committees an executive committee is organized to exercise control. It is, of course, as important to make a correct choice of the personnel of the committees as it is to define their functions and responsibilities. The exact scope of these committees naturally will vary according to the nature of the industry, but in a general way a few may be cited: engineering and drafting committee, planning committee, conditions committee, operations committee, materials committee, and relations and incentives committee. These committees hold their meetings at their own discretion and carefully consider matters referred to them. Decisions are referred to the executive committee for final adjudication, which, if favorable, makes the procedure binding. In this type of management the individual departmental head or foreman is used in a more or less functional capacity.

Efficiency Requirements

The best mechanical equipment of a plant that money can buy avails but little if labor is not properly utilized. On the other hand, the efficient utilization of labor will often overcome the handicap of a very poor equipment.

A high degree of labor efficiency cannot be secured unless there is fair dealing and proper feeling between management and men. Their rights must be respected; their status must be reasonably sure; and their personality must receive proper consideration. Each man has

Digitized by Google

his own peculiarities, and any system of management or discipline too inflexible to allow some latitude for variations from the normal does not measure up to modern requirements and will not secure the best results.

FIG. 3.—Analogy to Teamwork

The conditions under which labor is performed must also receive careful attention. If the arrangement of the shop is convenient, if tools are at hand when needed, if work in process is routed so as to avoid all unnecessary handling and hauling, if the conditions of physical comfort are properly cared for, all these act directly and materially to increase efficiency and decrease costs. The creation of an ideal equipment solves about one-half the problem of efficient management. The plant must be put under a satisfactory organization before it can be well managed.

The most successful factory organizations are those in which all departments having to do with production in any manner are subordinate to, and responsible to, one general head. Under this plan the factory departments are clean-cut as to results, as each department head is responsible to the central controlling officer without any intervening influences or interferences.

Assigning Responsibilities

Even though an executive be an all-round genius, he cannot personally direct the minute details of a busi-

Digitized by Google

ness of which he formulates the general plans. Before assigning any administrative function and outlining its corresponding responsibilities, there must be determined a certain ideal point to guide the master mind. There must be kept in view the need of specific details and the conformity thereof to the general plans.

Control has its installation as well as its administrative aspect. In the former sphere it fixes the relations of persons throughout the plant. In the latter sphere it selects the right personalities to fill the posts whose duties are thus fixed and supervises their daily performance of these duties. Control is to the business what the nervous system is to the body. It conveys orders from the master mind (central brain); it responds to stimulation from without; and it is more than a mere telegraph system of nerves, for it has well-marked secondary nervous centers, forming local subordinate brains concerned with special duties and responding automatically to stimulation without the central brain being concerned.

There is a place at which the problem of keeping in touch with the specific details of the agencies of the action controlled approximately equals in perplexity the problem of increasing touch with the general plan of which such action is a part. To converge functions from this place towards the master mind is to lose touch with specific conditions; to radiate them closer to the agencies of performance is to lose touch with the general plan.

As organizations expand, one function after another should be deputized to others down the administrative line, drawn to subordinate levels by the necessity of an accurate knowledge as to the nature and extent of the changes set up by production. Modern management is coming more and more to be based on measurement,

Digitized by Google

and if wise decisions and judicious control are to result, accurate detail records must be set up.

The definition of just what constitutes detail for an officer in a growing organization is expansive. Management gradually enlarges from a mere directing force to a coördinating agency.

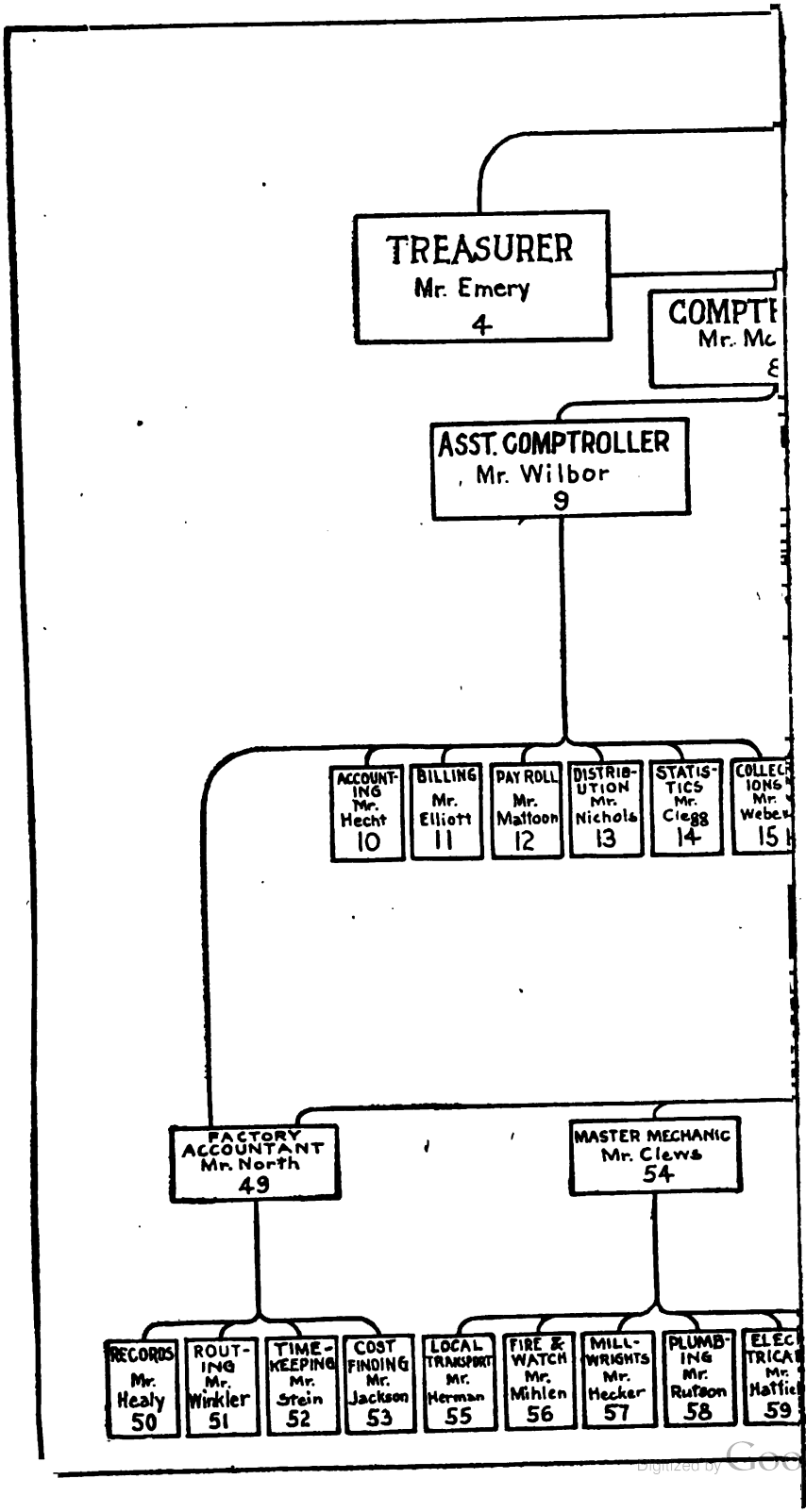
From the vantage ground of a superior officer, this sifting of everything to its proper level is the problem of the subordination of detail. The man of capacity often errs by working with energy rather than intelligence, not seeing that efficiency means not only to do a great deal, and to do it well, but also to be engaged constantly upon tasks of fitting caliber. If an organization is not large enough to keep a man of talent at his maximum work, the permanent solution is not to allow the individual to add lower functions and shade out the subordinate executive, but to use this surplus talent for attacking the most important difficulties which restrain growth, so that with the increase in the size of the organization there will come abundance of the proper kind of work.

From the viewpoint of the minor official, the proper administrative functions means dignifying him in the eyes of those over whom he is set. Stimulus comes from the opportunity to do a task large enough to arouse the interest; efficiency comes from the freedom to bring one's personality to bear in a manner harmonious with nature. Well-scattered responsibility sobers and settles a force of executives and develops and seasons their talents; for individual character is not developed by imaginary responsibility, but by actually carrying it.

In all history there are but few examples of armies that have done great things without the presence of two

Digitized by Google

Digitized by Google



Digitized by Google

very important elements, namely, good leadership and good discipline—the capacity of men for following leadership. There have been many instances where a change of leaders has transformed an unsuccessful into a triumphant army, and incidentally cases where the reverse has resulted. Above all what is needed for efficient production or efficient factory accounting is leadership.

Digitized by Google

CHAPTER IV

ORGANIZATION CHARTS

Making Organization Charts

The aim of control is the impelling force. We may conceive all the other functions of production fully organized and ready to begin and accounting methods devised and the staff at their posts, but "the spark of life," so to speak, is needed to set them at work. This thing wanted is the duly authorized order. In modern production this is given effect through a more or less elaborate organization, whose special business is to attend to the regular and systematic issue, dissection, and distribution of orders.

Material and equipment being perfectly inert require the laying-on of human hands to actuate them. In practice the duties of such persons have to be organized according to a definite plan, so that each has certain specific work to attend to.

The complete scope and the detailed operation of an organization plan is not easily grasped when it is viewed as a whole. For a just conception of its effects and operations the various responsibilities must be clearly seen and the relationship of one official to another and to the organization in its entirety be positively determined.

It is not always a simple matter to "chart" an organization for a specific factory, particularly where intri-

Digitized by Google

cate conditions obtain. Different conditions exist in every different plant and must be studied before a plan can be evolved. After the designer of the chart has informed himself as to the ramifications of authority, he will undoubtedly be able to outline roughly a chart which will meet the existing conditions. This chart will usually require considerable adjusting and modifying before it can meet these conditions to best advantage. The relationship of the various authorities is indicated. Each duty should represent a definite grade of qualification. Each duty should be precisely defined, so that no ambiguity exists as to its range.

When the draft is made, the course of procedure is carefully "tracked" from start to finish, such additions and changes as seem to be necessary being made in the chart. When this is done, a second rough drafting is made, possibly showing material changes, the relationship of the various factors being modified better to meet existing conditions in the light of coördination. Have they been so arranged that no gap or overlap exists? No jurisdiction should overlap. No man should be expected to serve two masters, if possible to avoid it. The spheres of duty must exactly join.

Under such circumstances the value of a chart as a clear epitomized presentation of the whole organization can hardly be overestimated. It brings out the practical working of the organization and shows any defects in it as hardly anything else could.

Frequently four or five charts will be drawn before a satisfactory one is devised.

As it becomes more generally realized how much depends upon the method of presenting facts as compared to the facts themselves, there is a sharp increase

Digitized by Google

in the use of graphic methods of presentation. An organization chart is an excellent example of the division of a total into its component parts. Such a chart should be devised for every organization, even more especially for those organizations which are shorthanded and are expanding the business by having one man hold the authority of several positions. It should be graphically shown what, if any, positions are but temporarily filled, in order that there need be no irritation or ill-feeling on the part of some that authority has been usurped. If such a chart is employed, there will be fewer cases of pique and less short-circuiting of orders.

Authority reaches down through the several branches of an organization in various ways. If a chart be properly planned, there can be no doubt as to the status of individuals with relation to those in authority. No two factory organizations are composed exactly alike. There may be some resemblance, in skeleton form, in all completely and successfully organized businesses. Very few enterprises are organized along exactly the proper lines, which is the one most prominent reason why there is such inefficiency in industry.

We know that the true correlation of functions is with the Loss and Gain Account of the business. It is, of course, true that successive functions must be correlated with each other, that a single department must be self-correlated, that all departments must be correlated with each other, but, after all, the Loss and Gain Account is the center with which each function, force, and department must be correlated. It is not difficult for us to recognize success as the center of correlation.

A forceful depiction of the niceties of adjustment necessary in a producing enterprise is one used by a large

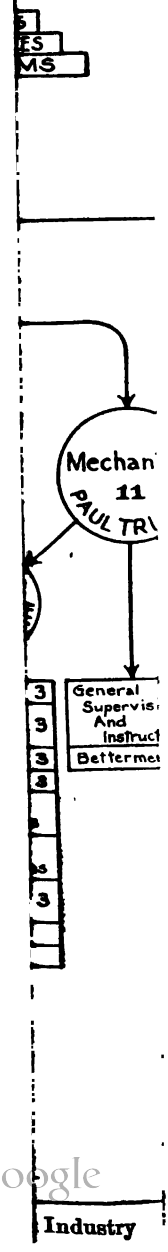
Digitized by Google

is-
es
e-
is-
m
In
g,
ds

rt-
he
is
its
ch
2),
nt
he
it
ed
ve.
ce
ce
as-
ler
all

ler
ms
ies
me
he

Digitized by Google



Digitized by Google

corporation of international fame in its Hall of Industrial Education, and above it the words, "Success comes from team play." Figure 3 is what is called a "three-horse hitch," a whippletree adjusted for the even distribution of pull for three horses. This shows the team play necessary for the success of the organization. In order for all to succeed, it is necessary for the making, selling, and recording divisions to pull together towards a common destination—profit.

Charting Line Control

Figure 4 is a chart showing a full and complete departmental organization illustrating line control in the automobile industry. Under the ramifications of this chart we see that the board of directors, through its executive committee (1) evolves certain policies which are in whole or in part passed on to the president (2), the treasurer (4), and the secretary (5). The president (2) has close relations with the vice-president (3), the treasurer (4), and the secretary (5). In this chart it appears that the vice-president (3) has no clearly defined duties other than that of an associate chief executive. In practice it is most common for the corporate office of vice-president to be linked with the functional office of treasurer, secretary, or general manager. The treasurer (4) has concurrent authority over the comptroller (8), upon whom devolves the direct guidance of all recording and accounting elements of the enterprise.

At this point it will be noticed that the comptroller is responsible not only for whatever accounting systems are devised, but also for all methods and responsibilities having to do with properties and stores up to the time they are delivered to the factory for processing. The

Digitized by Google

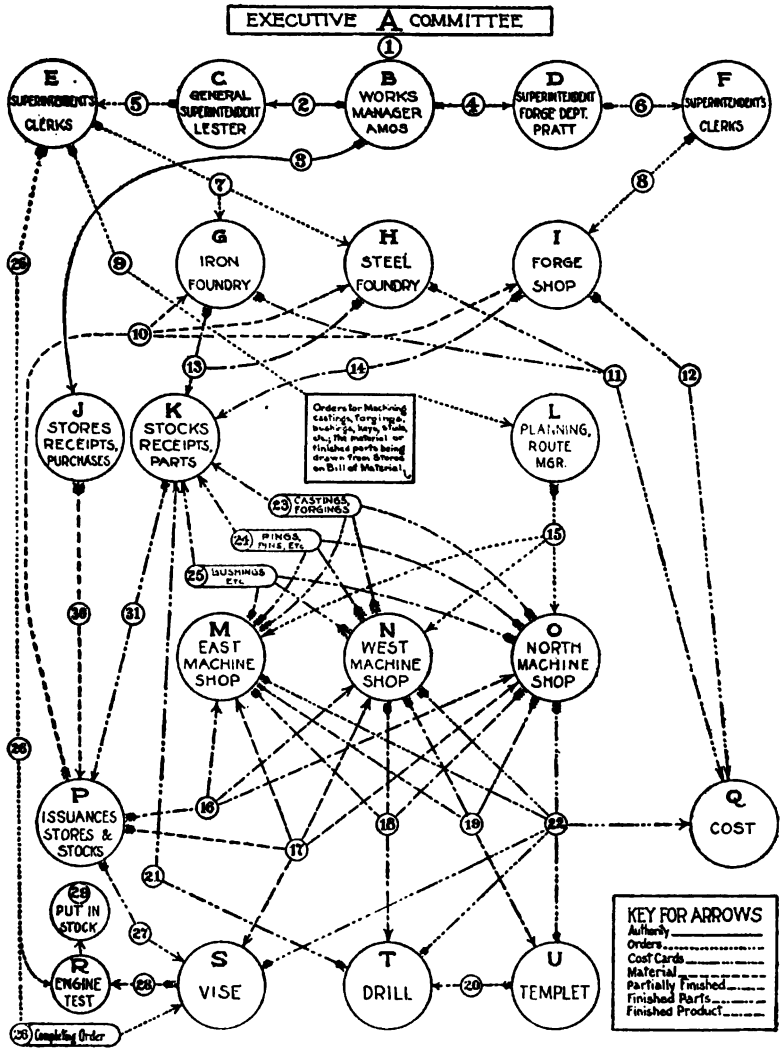


Fig. 6.—Chart Illustrating the Routine of an Order for Crowding Engines in a Steam Shovel Works

Digitized by Google

comptroller is the custodian of the company's property, while the general manager (6) is the manipulator of the assets for the purpose of creating profits. Fundamentally the general manager should assume responsibility for the kind and quality of product to be manufactured, and through the general sales manager (38) the disposition of these items of manufacture.

The general manager is responsible for all expenditures of the business under his control such as involved in the use of material, labor, and factory overhead, as well as commercial costs. He is responsible for improvements, extensions, and betterments.

The works manager (27) has jurisdiction over the direct and indirect production departments (through 54, 61, 64, 75, and 88) and concurrent jurisdiction in certain phases of the work of the factory accountant (49).

This type of chart as at present shown is not altogether clear at certain points without supporting qualifications. As for instance at 20, 49, and 92, there might appear to be an overlap of authority not existing in fact.

This might be remedied by explaining in terse tabular form as follows:

(1) At 20 (stores and stocks), the jurisdiction of the works manager (27) covers only the needs of certain materials desired at specified times, while that of the purchasing agent (19) covers the supply of such needs and the strict accountability for what remains.

(2) At 49 (factory accountant) the jurisdiction of the works manager (27) covers only the channels of information concerning the uses of material, labor, and expense in the plant, while that of the assistant comptroller (9) covers the comprehensive tabulation of factory operations and the articulation of the factory

Digitized by Google

accounts with the general financial books. (The domination of 49 [factory accountant] by 27 [works manager] would make discolored reflections of production costs possible.)

(3) At 92 (shipping clerk), the jurisdiction of the order clerk (45) involves only the shipping instructions, while that of the works manager (27) covers the supplying of goods, the means for packing same, and the facilities for conveying to the transportation media. (There are many instances, however, where the functions under the works manager's jurisdiction cease with the delivery of goods to the floor of the shipping room.)

Charting Functional Control

Figure 5 is a chart showing functional control as applied to the packing industry. In the present chart it will be seen that numerous instances occur where one person holds two or more distinct capacities. This chart was chosen purposely that the student may acquire a wider range of knowledge as to actual conditions in plants of other than maximum volume, which are far too often chosen as examples, thus giving the student exaggerated ideas of small plants.

The present chart is somewhat differently designed from the foregoing one. There are no hard and fast draughting rules in this connection, and charts of this character are quite usually the result of individual artistic conceptions and adjustments rather than studied adherence to distinctive types of devices.

In scrutinizing the source of authority in this chart it is at once apparent that the president and treasurer (1) dominates the executive committee (2), which is in

Digitized by Google

fact an advisory cabinet. It shows also that the general manager (3) is a power in shaping the policies of the concern, leaning to some extent upon the recommendation of the executive committee, but perhaps exercising his own judgment as to the enactment of laws based squarely on the committee's findings. This is approximately as near as can be attained to an exact pictorial reflection where the powers that be are predominating stockholders but, nevertheless, aim to be guided by intelligent advice from specially trained minds.

From the general manager (3) radiates authority to the sales manager (4), the superintendent (5), the purchasing (7), order and shipping (8), credit and collection (9), accounting (10), and mechanical and inspection (11) departments. From these various officials radiates authority to subordinate officials or functional heads. Under each of these officials and their subordinates is shown a chart of operative functions or activities. These functional heads are, in the chart, referred to as "consulting heads"; they deal directly with the men in the ranks giving advice and instruction. In many instances functional heads are not invested with fullest power, in which case the higher authority is designated by the number of the consulting head, a key to which is to be found in the upper left-hand corner of the chart.

Charting the Routine of an Order

In its usual form the production order is a formal written direction or authorization for product to be put in process; or, applied to nonproductive work, it is the direct or standing order for such work to be done. As a broad rule, no factory work, whether productive or

Digitized by Google

otherwise, should be begun unless covered by a specific order. In the case of frequently recurring duties of a nonproductive nature, such as cleaning out tanks, oiling machinery, making small repairs, etc., standing orders are usually issued, and all work done under such standing orders is charged to the particular order number to which it belongs.

The first step in the manufacture of an article or product under a modern factory accounting plan is, then, the issuance of a production or assembling order, as the case may be, which is a general authorization to those concerned to proceed with the manufacture indicated. This they do in accordance with the formalities and routine of the particular factory.

There is no generally observed rule as to the official by whom the production order is issued. Nor is there any general uniformity of practice. Every factory is a law unto itself, and its production order is issued by such official, or officials, or in such manner as seems best to its management.

Similarly there is no standard form, every factory adopting such shape and arrangement of production order as fits in best with its own requirements. Indeed, as a matter of practice, some lines of production issue no formal written orders at all, and there are circumstances under which written orders would be of no particular advantage. Thus, where the production is standard and continuous, the product may be turned out day after day under a standing order or with no production order at all. At other times production is begun on a verbal order from someone in authority, with perhaps a scale ticket or sheet showing each lot number with weights or inspection tallies, or other analogous record to serve

Digitized by Google

as an identification. This class of production is illustrated by packing houses with their "bunches" of live stock and by sawmills with their "jags" of logs.

In its simplest form the production order is merely a direct request, order, or authorization to the proper party to begin a specified production. In its usual form the production order goes beyond this, giving various details as to the products frequently combined with a requisition for material. To this are frequently added blanks for information concerning the progress and the details of production, so that when the operation is finished, the production order itself shows a more or less complete record of the whole operation.

Thus in the manufacture of shoes specific orders are put into process with a "tag" to accompany each "case." This tag is in itself the production order, but also bears the relevant data concerning production details and follows the goods from start to finish, serving in this way as a job follower. In the more efficient shoe factories, what is known as the "sheet" system or "schedule" plan is used to put the lots under the different tags in work in carefully arranged daily groups, moving through the factory on a prearranged schedule so that there will be no localized congestion nor interference between the various specific orders, while at the same time the full capacity of the plant is utilized.

The schedule plan is not peculiar to shoes but can be used with any product of a fixed process nature. Furniture, soap, iron safes, etc., are examples of such product. The prearrangement of work involved, with the subsequent pressure on all sides, to keep production up to the schedule time is very advantageous. This has come to

Digitized by Google

be recognized as an important feature of efficient management.

Where various articles are being simultaneously produced, something more accurate than practical instinct is desirable as a guide. In a very small undertaking this practical instinct may be sufficient, but we are not considering the case of very small undertakings. The moment the work gets too large in volume for all its minute details to be carried in one head, the necessity for a close analysis and system of reports and records becomes marked. The elements which enter into the handling of an order from start to finish are many.

Chart Details

Figure 6 is a chart showing the channels through which orders and responsibilities are passed along in the making of a given quantity of crowding engines for a steam shovel of a standard type. There is also shown the paths of travel of material, partially finished, and finished parts, also the record cards for material and labor.

The present chart represents line control partially under old school conditions, but with a few features of modern industrial management injected, as for instance, a modern cost-finding plan and a planning department. However, this example is intended more to create a mind picture of recording and accounting relationship than the exact course of deputation, although it can do both.

The need of products of certain kinds usually is made known by the sales department, and in the present chart the order emanated from the executive committee (A) to the works manager (B). Foundry and machine

Digitized by Google

shop work comes under the jurisdiction of the general superintendent (C) and through him to his clerical force, orders being issued by his clerks (E), while all forgings are under the forge department superintendent (D), orders being issued by his clerks (F). The iron foundry (G), the steel foundry (H), and the forge shop (I) supply what becomes known as "parts," being made in quantities usually larger than for immediate needs, particularly if such parts are standard. These manufactured parts are put into what is called "stock," as distinguished from "stores" of raw material. The stores and stocks department is represented on this chart by both incoming and outgoing material. Receipts of raw material (J) includes purchases specifically authorized by the works manager (B) and receipts of parts (K) the product of factory departments G, H, I, M, N, O, and T. All issuances of both stores and stocks are represented by one circle (P). (The arrows 30 and 31 merely "close the circuit" between receipts and issuances of stores and stocks.)

The route manager (L) has the planning of work for the east (M), west (N), and north (O) machine shops and the drill (T) and the templet (U) departments. The vise (S) and the engine test (R) departments receive orders directly from the general superintendent's department (C).

The key at the lower right-hand corner shows the exact meaning of the various indicated lines in the chart. Arrow 1 represents the authority of the executive committee (A) given to the works manager (B). Arrows 2 and 4 represent authority passed on to the superintendents (C and D respectively). Arrow 3 represents authority given for the purchase of certain raw materials (J). Arrows 5 and 6 represent the instructions

Digitized by Google

given the clerical forces (E and F) for the issuance of certain formal orders.

Arrows 7 represent orders given to the foundries (G and H) for necessary castings. Arrow 8 represents orders given for all necessary forgings. Arrow 9 represents orders for machining of any nature or kind.

Arrows 10 represent raw materials drawn from stores (P) by G, H, and I.

Arrows 11 and 12 represent time records of labor consumed and requisitions or reports of materials used by G, H, and I.

Arrow 13 represents rough castings from foundries G and H passed to stocks (K). Arrow 14 represents forgings from forge shop (I) to stocks (K).

Arrows 15 represent the allotment of orders to the three machine shops (M, N, and O).

Arrows 16 represent the transfer of rough castings from stocks (P) to the three machine shops (M, N, and O).

Arrows 17 represent the transfer of material stores (P) to the three machine shops (M, N, and O) and the vise department (S).

Arrows 18 represent partially completed work passing from the machine shops (M, N, and O) to the drill department (T). Arrow 19 represents similar work which has first to go to the templet department (U) and Arrow 20, where it, in turn, passes to the drill department (T). Arrow 21 represents where the parts in the drill departments (T) finally pass as finished parts to the stockroom (K).

Arrow 22 represents time and material records from the three machine shops (M, N, and O) and the time

Digitized by Google

and material contributed to the production of parts by the vise (S) drill (T) and templet (U) departments.

Arrows 23, 24, and 25 represent finished parts transferred to stocks (K) from the three machine shops (M, N, and O).

Arrows 26 represent an assembling or completing order; Arrow 27 represents the transfer of parts from stock (P) to be assembled in vise department (S). Arrow 28 represents the finished engines transferred to the testing department and finally to Area 29, representing the finished stockroom.

Arrow 30 represents merely the connecting link between the receipt of raw material in the storeroom (J) and the point of its issuance on requisitions (P). In like manner Arrow 31 represents the flow of finished or semifinished parts from stockroom (K) to the point of issue (P).

Digitized by Google

PART TWO—CONTROLLING RECORDS.

CHAPTER V

CONTROLLING ACCOUNTS

Definition of Controlling Accounts

A controlling account is one supported by analytical or subsidiary accounts. It presents in totals, synthetically, what is presented in the analytical accounts or records in detail, showing explicitly the net results of the total debits and credits to the subsidiary accounts.

Thus a single Material Account in the General Ledger or the Private Ledger may show the aggregate debits and credits of three thousand or more individual accounts with various kinds of material, these latter appearing in detail in a subsidiary Stores Ledger. The totals of these subsidiary accounts must, of course, agree with the totals of the main or "controlling" account. When this is so, the accounts are said to be in articulation. Though of almost elementary simplicity and of obvious advantage, the intentional and intelligent use of the controlling account is comparatively modern.

Inasmuch as the establishment of ledger controls has resulted from the evolution of the Journal, and for the further reason that the whole theory of controlling accounts rests more upon a question of mechanism of books than upon a question of principles, it may be

Digitized by Google

well to make the controlling accounts serve as a connecting link between the theory of the books and the general classification of the accounts which the books contain.

Controlling accounts are positively necessary in modern factory accounting, as the factory accounts should, as a matter of course, articulate with the general financial books of the concern. When this is done, an independent and complete balance sheet and profit and loss statement may be made up each month from the General Ledger or its equivalent without recourse to the subsidiary records. If the General Ledger proof of postings is correct, the balance of the controlling account must also be correct. Then, if the sum total of the balances taken from the subsidiary ledger, or ledgers, as the case may be, does not articulate with the balance of the controlling account, the error, or errors, will be found in the subsidiary records.

Before the advent of the columnar journal with its division into integral parts, it was possible, for balance sheet purposes, to obtain the net amount due from customers, even though the General Ledger was not entirely posted or was out of balance. An analysis of the Journal, if accurately made, would give the sales, the returned sales, and allowances, as well as the settlements made by customers. But the process was lengthy and the delay irksome. The demand became insistent for timely information concerning financial facts.

The analytical results given by the books of original entry, which were subsequently built up from the Journal, made it possible to obtain not only the minutest detail of every transaction, but, as well, periodical totals of broad classes of facts. All financial books are either

Digitized by Google

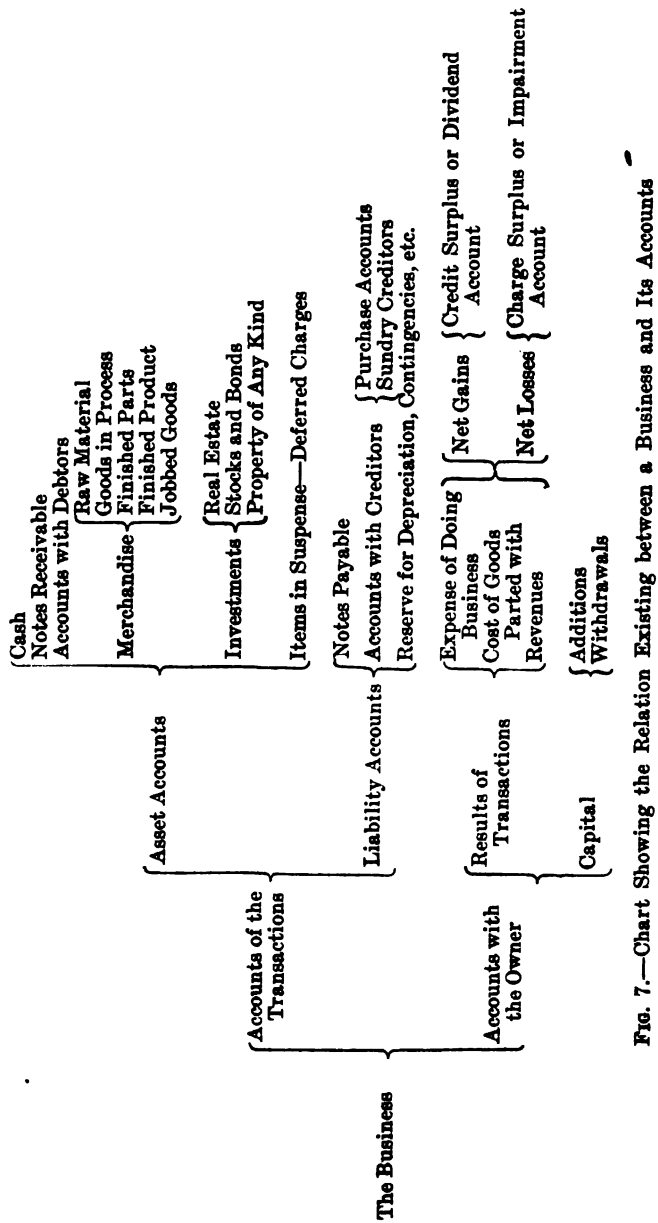


FIG. 7.—Chart Showing the Relation Existing between a Business and Its Accounts

Digitized by Google

Journals or Ledgers in effect and, in a well-constructed plan of modern production accounting, the factory records come well within the category of financial books.

Cost records which are not capable of being reconciled or agreed with the actual results shown by the controlling financial books, are practically valueless, inasmuch as there can be no assurance even of their approximate accuracy.

Beyond this, by means of controlling accounts the representative accounts of an extensive plant may be brought within the compass of a single ledger, and these accounts may, if desired, be still further condensed into one small Private Ledger, which will then show the essential facts and conditions of an entire plant.

The controlling accounts of a business should show a graphic reflection of its operations and the conditions of its various financial phases from the purchase of raw material to the division of profits. In order to do this successfully, there must be a most carefully classified system of records, and the focused results of these records must be embodied in one book to which all other books and records in the plan are subsidiary.

As books of original entry are cut up or segregated into the component parts, so should be the book of final entry in which results are reflected. This is mechanically accomplished by guide sheets planned according to the requirements of the individual business, placing each group of accounts in properly arranged sequence.

The relationship and proper classification of the various accounts of a manufacturing business are illustrated by the chart shown in Figure 7. Accounts peculiar to particular lines of production are not included. This

Digitized by Google

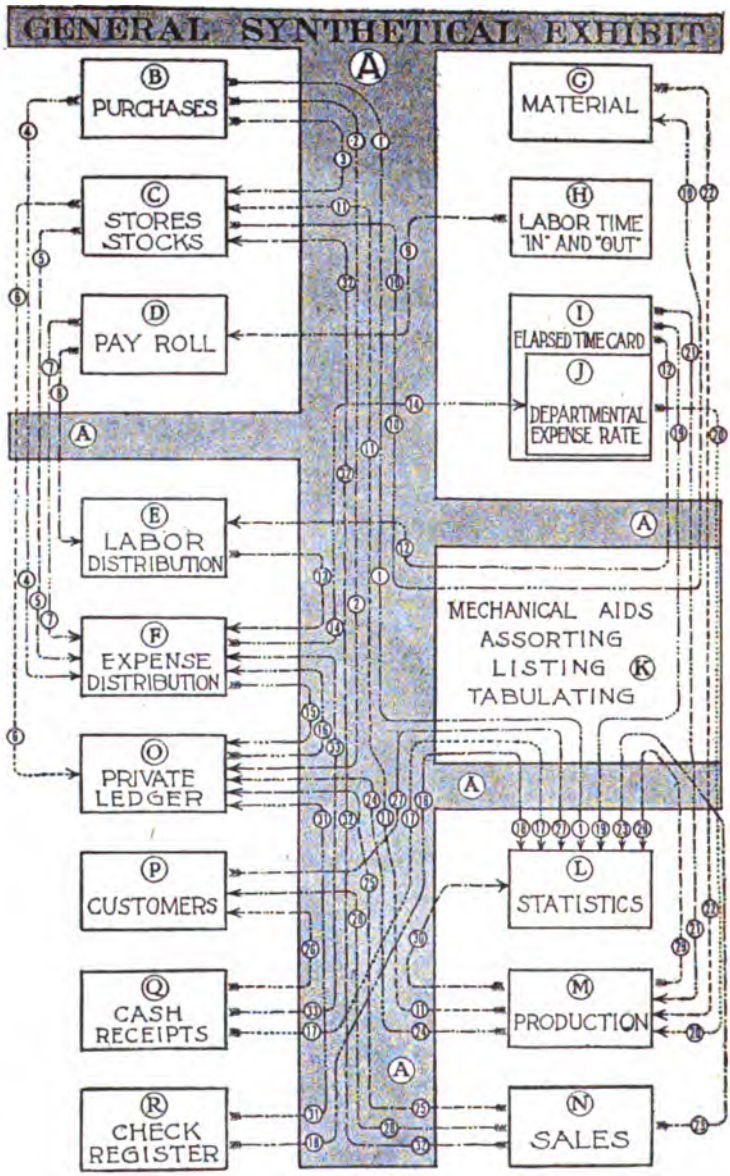


Fig. 8.—Chart Showing the Routine Controlling Entries

Digitized by Google

chart is intended merely to show the general relations which certain classes of accounts bear to the business as a whole or to other classes of accounts of the same business. A more complete chart is shown in Figure 9

Routine of Controlling Entries

It must always be borne in mind that forms in themselves, no matter how well adapted to their special purposes, do not constitute an accounting system but are merely a means of recording, exhibiting, and preserving the operations of the system.

The forms referred to in chapters following have each in themselves points of value, but in order to be of the greatest value in any system of factory accounting, they must intermesh or harmonize with the other records in such manner as to form a complete and smoothly working system.

A chart and the right use of the imagination enable one to keep in mind an image or picture of the whole field to be covered, so that no one part will be overlooked while the attention is concentrated on some other parts. This is especially important to the person who is devising a complete system of financial and factory cost accounts, so that each point will be covered with due reference to every other point and all the several units will so dovetail that the results will constitute a consistent and harmonious whole.

The chart shown in Figure 8 presents in diagrammatic form the books and records used in a system of factory accounting which is embodied in the general financial records. These are so arranged and connected as to

Digitized by Google

show the functions of each, the course of entries from one to another, and the general relation each bears to the others and to the system as a whole.

In the chart as presented, the numbered arrows indicate the course of entries from one record to another, while the various records and forms are represented by "boxes" or rectangular outlines. Any other distinctive form would have done as well, the squares having been selected as a mere matter of personal preference and because they conveniently fit the available space. The location of the various forms on the chart was controlled to some extent by the necessary course of the arrows which indicate entries.

The shaded central portion of the chart (A) represents the synthetical or controlling records or accounts, preferably kept in a book called the "General Exhibit," though with considerably less convenience they may be kept in a General Ledger under old-fashioned posting routine. The arrows indicating the course of entries passing through this shaded portion indicate that corresponding entires are made in a controlling account. The entry will be "under control" for the reason that the totals of all balances of the particular month in all the various debit and credit columns of the analytical records must exactly articulate with the corresponding column in the General Exhibit. If any item has been lost in posting, the omission will be at once discovered on comparing the totals of the corresponding columns of the General Exhibit and the analytical records.

The following tabulation takes up in order the books and records shown on the chart. The figure number references after each show where forms of the character indicated may be found in the present volume. The page

Digitized by Google

53
ms

ap-
11,
32;

ly,
09;
er-
64,
nd,
8,
36.
63,
37,
07,

44.
ly,
nd.

Digitized by Google

5

sl
o
o

ca
w
b
ti
ha
er
sp
w
of

se
pr
th
ke
ro
pa
re
T
th
th
re
co
lo
or
of

ar
re
in

Digitized by Google

references after each show where these records or forms are discussed in the text.

(A) General Exhibit: Figures 11 to 15; generally, Chapters VI-VIII.

(B) Purchase Analysis: Figures 18, 19; pages 105, 111, 141-142, 146, 247, 259.

(C) Stores and Stocks Records: Figures 11, 12, 15, 32; pages 75, 88, 297; and, generally, Chapter XV.

(D) Pay Roll: Figures 81, 82; generally, Chapter XVI.

(E) Labor Distribution: Figures 68, 69, 80, 82; generally, Chapter XVI.

(F) Expense Distribution: Figures 83, 84; pages 108-109; and, generally, Chapter XVIII.

(G) Material: Figures 1, 11, 12, 15, 19, 20, 41 to 50; generally, Chapter XV.

(H) Labor Time "over all": Figures 1, 52, 53, 55, 56, 64, 65, 72, 73; pages 8-9; and, generally, Chapter XVI.

(I) Labor Time "on jobs": Figures 52 to 80; page 8; and, generally, Chapter XVI.

(J) Departmental Overhead: Figures 1, 83, 84; pages 7, 8, 303-304; and, generally, Chapter XVIII.

(K) Analytical Compilations (mechanical aids): Figures 36, 37, 47, 68, 69, 80, 81; pages 97, 99, 102-103, 108, 145, 173, 254-263, 283-287.

(L) Statistics: Figures 14, 23 to 29, 35 to 37, 68, 69; pages 87, 99, 100, 103-104, 107, 164, 173, 199, 253-263, 283-288.

(M) Production Register: Figures 20, 23 to 28; pages 107, 164-165, 198.

(N) Sales Analysis: pages 11, 12, 18, 87, 95, 102-105.

(O) Private Ledger: pages 46-49, 77, 82, 102, 115, 143-144.

(P) Customers Accounts: pages 73, 89, 102-103.

(Q) Cash Receipts: Figure 16; page 122; and, generally, Chapter IX.

(R) Check Register: Figure 17; pages 133, 142-146; and, generally, Chapter IV.

Digitized by Google

The following tabulation has reference to the numbered arrows in Figure 8. These arrows indicate relationships of entries, where entries are made.

(1) The tabulation of purchases by material classifications, departments, etc.: Figures 12 (line 9), 19, 32, 34; pages 105, 111, 143-145, 247-248.

(2) (a) Purchases of equipment posted to controlling accounts: Figure 12 (lines 9, 11); pages 107, 111, 143.

(b) Totals of various classifications of purchases posted to controlling accounts: Figure 12 (lines 6, 9, 11, 16, 19, 20); pages 107, 143.

(3) The posting of material purchases to the "going inventory" record: Figure 32; pages 148, 241, 244-247.

(4) Items purchased that properly are chargeable to expense classifications: pages 7, 325.

(5) (a) Uses for material and supplies for expense purposes about the plant when not handled through the Production Register: Figures 12 (line 28), 37, 47; page 96.

(b) Adjustments that may be made necessary by disagreement between the actual inventory total at a given date and its corresponding Stores Ledger Account, chargeable to expense if there be no reserve set up for this purpose: Figures 12 (line 3), 32, 48; pages 88-89, 243, 247, 269.

(6) (a) The transfer of the monthly or periodical total of issuance of each separate material classification to a corresponding controlling account: Figures 12 (line 28), 15 (lines 3, 7), 32; page 247.

(b) Adjustment of inventory differences when charged to a reserve account instead of directly to expense: Figure 12 (line 3); pages 88, 243, 269.

(7) Direct charges from pay records to expense classifications for other than direct producing labor: Figures 80 to 82; pages 288, 291, 295, 329-331, 338.

(8) Time of direct producers that requires analysis as between direct and indirect production: Figures 53, 55, 59, 64, 72, 73, 75, 80 to 82; pages 276-279.

Digitized by Google

(9) (a) The accumulation day by day, of employees' time on the pay roll: Figures 80, 81; pages 86-87, 284, 288-294.

(b) Used on a subsidiary record as a basis of compiling the pay roll: Figures 80, 81; pages 284-288.

(10) Credits which are given the stores and stocks record for the material and finished parts issued to production orders: Figures 12 (line 28), 15 (line 7), 32, 37; pages 6, 244-247.

(11) Debits to Stock Accounts for finished parts or finished product completed under a production order number: Figures 12 (line 23), 15 (lines 8, 9), 32; pages 6, 244-247.

(12) Summary of direct or indirect production as a means of (a) arriving at totals for controlling accounts and (b) proving accuracy of pay roll by accounting for all labor paid for: Figures 12 ("accrued labor" group), 80 to 82; pages 101, 114, 284, 288-295.

(13) (a) Certain portions of the time of direct producers which is charged against indirect production and (b) lost or dead time: Figures 12 (line 22), 64; pages 3, 10, 276-279.

(14) Information available as basis for determining the man-hour constant for each individual department: Figures 64, 65, 68, 69, 81, 82, 84; pages 310-311, 326-329.

(15) (a) Analysis, distribution, and diffusion transferred from one controlling account to another: Figures 15 (line 25), 29, 83, 84; pages 7, 102, 109, 114, 211, 319.

(b) Transferring to their proper account any reserve, suspense, or asset accounts that may have, as a convenience, first been accumulated under the factory overhead or commercial cost classifications: Figure 15 (line 25); pages 108, 329.

(16) Monthly apportionments of reserve and suspense items charged into current expense: Figure 15 (lines 10 to 23); pages 108, 112-113, 329.

(17) Classification of cash receipts by geographical or territorial subdivisions: Figures 12 (lines 8, 26, 29), 16; pages 87 (reference to sales will apply to cash receipts), 90 (re notes), 122, 253-259.

(18) Classification of disbursements: Figures 12 ("exchequer" group), 17, 35; pages 81-85, 109, 133-139, 142-147.

Digitized by Google

(19) (a) The departmental totals of elapsed time by days: pages 283-287, 291.

(b) The compilation of statistics for arriving at average cost of operations on the same parts over whatever period desired: Figures 23, 29, 36, 51; pages 3, 19, 90, 195, 198, 210, 244, 259-261, 269.

(c) Collating cost by operations on standing orders where work is used as filler between other short-time jobs: Figure 36; pages 164.

(20) Application of the departmental expense constant ("overhead") to individual production order numbers on the Production Register: Figures 20, 23 to 29; pages 7-8, 170, 195, 203-211, 310-316.

(21) The entry of a labor charge against its proper production order number on the Production Register: Figures 52 to 75; pages 8-9, 168-169, 221, 272-276, 284.

(22) The entry of a material, or finished parts, item against its proper production order number on the Production Register: Figure 20; pages 90, 101, 168-170, 195, 259-261.

(23) The classification of sales (a) by commodities, (b) by agencies, (c) by states or geographically, (d) by advertising sources, and (e) by any other desired angle of information: pages 11-12, 18, 87, 102-105.

(24) (a) The entry to, or comparison with, the controlling accounts in the Private Ledger of departmental totals of material, labor, and overhead (expense) charged against production orders during the period: Figures 15 ("goods in process" group), 20; pages 111-112, 164-168, 187-197, 200.

(b) The entry to controlling accounts in the Private Ledger of totals of production for the period (finished parts and finished products): Figures 12 (line 23), 15 (lines 8, 9), 20, 23 to 28, 36; pages 3, 95, 111-112, 170-172, 198-200, 259-261.

(25) The entry to the controlling accounts by classification, or to the Profit and Loss Account, or to both, of sales totals and of the cost of the goods parted with: Figure 15; pages 87, 95, 110-111.

(26) Credits to individual accounts with customers, for gross

Digitized by Google

amounts of payments made (cash received plus discounts or other allowances): Figures 12 (lines 4, 12, 13), 16; pages 100, 122-133.

(27) (a) The classification of customers' records for various statistical data, (b) monthly totals of debits, credits, and balances (for proof of postings or so-called "trial balances"), (c) perhaps a "Peak" sheet, or "Curve" sheet maintained to show monthly or periodical fluctuations of grand totals of customers' and debtors' amounts: Figures 14, 15 (lines 2, 3); pages 99, 104-105.

(28) Charges made to individual customers and others, for goods sold to them: Figure 12 ("receivables" group); pages 87, 95, 105.

(29) The compilation of various data concerning production: Figures 6, 14, 23 to 27, 29, 37 to 51; pages 3, 9, 18, 86, 111, 162-170, 184-200, 210-211, 261-270.

(30) Information furnished from time to time (according to the plan used) as to units of production completed: Figures 23 to 29, 36; pages 41-42, 198-200, 211, 213, 259-261.

(31) The entry of totals to the controlling accounts in the Private Ledger for payments for purchases of material, expense items, machinery, or other assets acquired, or for money advanced for any purpose whatsoever: Figure 12 (lines 6, 9, 11, 16, 19, 20, 23); generally, Chapter VII.

(32) The entry of credits to individual stores and stocks accounts for the items of goods supplied to customers: Figures 12 (line 25), 15 (line 3), 32; pages 87, 89 (contra), 95.

(33) The transfer to commercial costs of total amount of cash discounts and other allowances to customers: Figure 12 (lines 26, 29); pages 95-96.

Classification of Accounts

Figure 9 shows how the details of a manufacturing business are focused down by classes of accounts to general groups of accounts.

Digitized by Google

Economic or nominal accounts are those opened during the accounting period to record conversions of assets resulting in operating losses or gains. Incidentally a warehouse may be filled to the ridgepole with goods and yet no profit be made nor any loss sustained until the goods are actually disposed of and turned into cash or a receivable. Hence anticipated or "paper" profits or losses requiring the increase or decrease of real accounts are more properly handled through operating reserve accounts (see page 108) than through the economic accounts.

The broad use of the expression "loss and gain accounts" as applied to the economic or nominal accounts is open to objection in that it vitiates one of the main purposes of accounting. To call a cost a loss tends to obscure principles, as accounting seeks to differentiate between them rather than confuse them. Power, for example, is not a loss, but an expense necessary to obtain for the business a factor which is prerequisite.

Real accounts are divided into various groups for expressing the financial status of the business. In the chart under the asset group appears several subheadings having to do with the permanence or liquidity of the investment. Taking them in their order, we have:

(1) *Active assets,* meaning that they are in a liquid or fluent state presumably worth 100 per cent as financing media.

(2) *Passive assets,* meaning inert, but capable of receiving influences, usually subject to sharp discount in liquidation. In this group is included (a) assets to be converted into other conditions for the benefit of the business as a whole, (b) assets to be sold at a profit,

Digitized by Google

either in the identical form in which they were invested or acquired, or after they have been subjected to a process altering their nature, and (c) assets of a more or less wasting nature, invested in the business to serve as a basis for operations.

(3) *Fixed assets,* meaning those to remain permanently invested in the business to serve as a basis for operations.

(4) *Representative assets,* meaning investments in certain lines of development, the particular subject matter of which their several names indicate. This class is very frequently referred to as "intangible assets" on the hypothesis that it represents something, the existence of which may be discussed but is not palpable. It may be intangible, but nevertheless it must rest upon something tangible and has, therefore, a salable, though not positively fixed or definite, value.

(5) *Deferred charges,* meaning certain benefits acquired by and for a going concern, the full realization of which is spread over extended periods and the value of which accrues in such periods rather than the present, which holds for them very little, if any, debt-paying qualifications.

In like manner the "liability" group shows several subheadings having to do primarily with the order of precedence in which the debts or pecuniary engagements of a concern take rank. These are explained as follows:

(1) *Bonded liabilities.* Bonds are, generally speaking, a first lien on the properties. They are in effect long-time promissory notes bearing interest at a stated rate, issued numerically in units of like denomination, payable to bearer or to a person registered on the books of the

Digitized by Google

company issuing them, pledging to the aggregate of the bondholders certain specific properties described cursorily in the instrument itself and in full detail in the contract which gives the trustee the right to sell the pledge for the benefit of the holders of the instruments if either principal or interest is defaulted at maturity.

(2) *Floating liabilities,* meaning the current items or sums due to outside creditors, which may include (a) those which are due, but not as yet payable in consequence of the terms of credit extended, (b) those for which indebtedness has been incurred, but which are, at present, neither due nor payable, and (c) those which are past due.

(3) *Deferred credits,* representing nothing which has to be met for current purposes. For the most part this group consists of (a) reserves representing actual losses of capital through operations, charged to operations or to manufacturing cost of goods and temporarily withheld from the asset accounts which they would reduce if directly applied, and (b) reserves representing charges to operations for losses or costs which have not yet materialized but will positively materialize in the future.

(4) *Capital liabilities,* meaning the liability of the company to its stockholders for the capital paid in or subscribed, together with all surplus values and other increments which have not been taken out of the business by the payment of dividends.

Economic accounts do not usually require as many and diversified groups as do the real accounts, in that the factors involved are less complex. The first problem in constructing a system of purely commercial accounts is always the extent of the analysis between

Digitized by Google

different items of cost and different sorts of revenue. Every cost which can be differentiated from other costs and every receipt which can be differentiated from other receipts, should be so treated. Then it is possible to judge whether the cost is worth while and whether the price must be regulated on a new basis. With a proper segregation of commercial costs and of production costs, and a full knowledge of these latter, a just and proper selling price can readily be determined. Also the proper and economical conduct of the selling department is greatly facilitated.

In former years the determination of costs usually waited until the end of the fiscal year, when an inventory was taken and the costs roughly determined. Modern requirements demand closer, more accurate, information. If production costs vary, the management must know, and know quickly, what the variation is, the cause, and, if an increase, whether it may be rectified or whether it necessitates a corresponding increase of selling price.

For this reason in the great majority of producing establishments the old annual period is displaced by a shorter period, usually a monthly or four-week period. The four-week period, making thirteen periods in the year, is advisable where the pay roll is weekly or biweekly, and the calendar monthly period is advisable where the pay roll is monthly or semimonthly. The plan of having the closing period "articulate" with the pay-roll period enables the cost department to get at the facts of labor costs without having to "dig" for them.

Broadly considered, economic accounts have but three general subdivisions, as follows:

Digitized by Google

(1) *Accruing commercial costs,* which are items pertaining purely and simply to the sale of product as contradistinguished from the production of such product. This includes also expenses which have to do

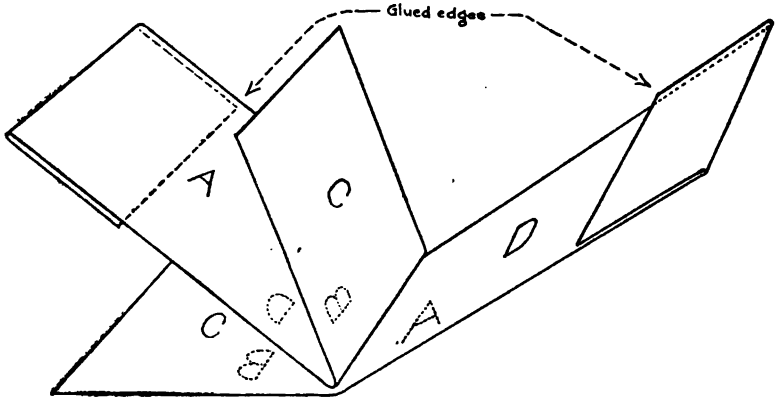


FIG. 10.—Plan for Book Made Up of Long and Short Leaves

more or less directly with the delivery of the product and with collecting, handling, freight on out-going product, allowances after product has left the factory, etc. Such expenses are a proper charge indirectly to Loss and Gain, but not through production, and any attempt to fasten them on production will be a purely arbitrary process, entirely without advantage and entirely destructive of accurate cost.

(2) *Production cost of goods disposed of* is exactly what the name implies. In other days interim statements of profits or losses were purely hypothetical, based on estimated cost of product. In the more modern manufacturing establishments a perpetual inventory takes the place of the annual physical inventory of former days. This perpetual inventory may be said to be essential to an accurate and effective cost account-

Digitized by Google

ing system. With it, the goods on hand and their values can be determined from the books at any time with but little labor and delay. If materials or goods are used or sold, they are deducted from the quantities or numbers shown to be on hand by the perpetual inventory; therefore this inventory shows at all times just what materials and goods are on hand and their values. Thus through correlated records can also be determined the results from the operations of the business.

(3) *Revenues,* which are the gross amounts of income from the various sources or classes of transactions participated in by the manufacturing proposition to which it is applied. As a matter of mere terminology this group may be called "Income," "Gross Income," "Gross Revenue," or any other fitting caption suited to the judgment of the designer of a chart for any particular business.

Account keeping by hand with its hard and fast entries on books and sheets is at best but stiffly adaptable to the many-sided questions, whose answer it is its function to provide. Limitations by rigidity of form, which makes it represent as absolute, conclusions that are only conditional, is its greatest defect.

Modern accounting mechanisms and aids, more fully discussed in Chapters XI, XV, and XVI, offer the utmost flexibility, or rather fluidity, in mode of expression. This is accordingly, for all analytic purposes, indefinitely to be preferred to the fixed form records.

A prerequisite for rapid handling under the newer conditions is that numerical codes must be used to represent certain data. Code numbers for this purpose are shown in the present chart and are here explained.

Digitized by Google

For the avoidance of confusion debit entries are, in the main, assigned even numbers and credit entries odd numbers.

For instance an entry charging "factory material" to Department 3 would show the charge as No. 330 (even) and the credit as No. 75 (odd). An item of supplies drawn from the storeroom would show the charge as No. 137 (exception) and the credit as No. 77 (odd). In this latter case an exception occurs, and it is because of the fact that in Groups E and F the great bulk of entries are charges, the only credits being to rectify errors, in which case the 200 prefix is used instead of the 100. This, however, is not a hard and fast rule, as numbers may be assigned as desired. It is quite possible to have the various combinations of numbers represent specific information to a greater extent than is here depicted, as for instance, to have certain classes represented by digits of the tens value, while the subclasses thereunder are represented by the digits of units value.

In the practical use of a numeric plan those concerned very quickly come to know groups like, for instance, "equipment accounts" in the 400 group, "capital" in the 600 group, etc.

The letters shown opposite the group in the chart are merely for conversational brevity between the clerks, who may speak of a "D account," an "X item," etc.

Digitized by Google

Digitized by Google

No.
Cr.

Digitized by Google

CHAPTER VI

STARTING THE GENERAL EXHIBIT

Mechanical Features

The General Exhibit, also frequently known as the "Balance Sheet Ledger, "General Business Record," "Synoptic," "Cash Journal," "Daily Exhibit," etc., is a book of record designed to give a synthetical presentation of the conditions as a whole. It is intended to show totals only, the details of these totals being found in subsidiary records. It is quite possible, however, and it is a very frequent practice, to make certain classes of original entry in this book.

The groups of accounts on Figure 9 are represented on the General Exhibit by columns, and when the summarized results from these groups of accounts are properly entered on the General Exhibit, it becomes a "going balance sheet" of the business.

Ordinarily the number of columns involved makes one think of it as a very large form, which perhaps it would be if arranged on the plan of an ordinary book. It is, however, usually constructed with wide and narrow leaves, used after the manner of master and slip sheets, so that the requirements of the General Exhibit are secured in a comparatively small space.

If a book thus composed of long and short leaves is bound up in the usual style, it is obvious that it will be much thicker at the binding edge where both long

Digitized by Google

and short leaves are in evidence, than at the outer edge, where only the long sheets appear. This results in a distorted appearance, which becomes worse as the book seasons, the covers "caving" inward and the book generally becoming "sloppy."

A plan for preventing the distortion of the book is to provide a compensating reinforcement of the long sheet. For this purpose the sheet is made longer than would otherwise be necessary, the extended portion, or flap, being of such length that when folded back on the sheet of which it is a part, it will more or less exactly fill up the space between the end of the short leaf and the outer edge of the book. The flap, or fold, of the long sheet is ruled on the exposed portion so that it forms the outer part of the page, and is glued in position. The general effect of the plan is to make the long sheet of the double thickness from the end of the short sheet to the outer edge of the book.

The exact point at which the reinforcing flap ends, will, of course, vary with different forms, but it should always be made to come in such position that figures are not likely to be written frequently over or near its edge.

Figure 10 will help to explain the construction of a long and short leaf book. In this cut the long sheets are represented by A and D, A representing the left-hand side of a folio, and D, the right-hand side of the same folio. The short sheet coming in between is represented by dotted B and C, B representing the first page of the short sheet, and C, the second page. Under this arrangement, if an entry is made extending across the entire folio, it will begin on A, be continued on B and C, and end on D. The new folio beginning with dotted A will, if completed, be a duplication of the one just dis-

Digitized by Google

Digitized by Google

	BOR
K No. 2	r.
Cr.	
	428
22418	
	63
4600	
27018	05
	5
27018	960

Digitized by Google

cussed, the page which backs D forming A of the new folio. A, B, and C of the following folio are ruled on a single sheet, which is so folded in binding as to make D A the long sheet and B C the short sheet.

The long sheet is folded back, as shown in illustration, sufficiently far to make it a double sheet from the end of short sheet C to the outer extremity of the page. The folded-over portion of the long sheet is glued at the edges only. This point is important, as the result is very unsatisfactory when the entire folded-over portion, or flap, is solidly glued down.

While the General Exhibit is in practice frequently referred to, it will not require frequent entries, as only the totals of the subsidiary records are shown on it, with perhaps an occasional adjusting entry. The plan of the General Exhibit permits its use for original entries if desired, but the results are much more satisfactory if it is relieved entirely of the details of subsidiary records.

The columns of the General Exhibit will usually be varied, according to the requirements of the particular business, perhaps by the addition of columns to handle accounts, or groups of accounts, which have not been provided for in the chart (Figure 9) or, on the other hand, by the omission of some of the columns, merging two or more columns into one.

The General Exhibit is opened with a balance sheet of the business, so arranged as to conform to the columns of the General Exhibit. Once started in equilibrium, it must be kept in equilibrium, since for every item of debit entry there must be a corresponding entry or credit, and vice versa. The General Exhibit is the perfected idea of double entry and is complete in itself so far as being in balance is concerned. The subsidiary

Digitized by Google

Balance Sheet

Assets

Imprest Fund	0	$ 500.00
Current Cash	10	1,827.19
Bank No. 1	20	41,419.28
Bank No. 2	22	28,642.71
Notes Receivable	30	28,695.80
Secured Funds	40	85,000.00
City Customers	50	92,614.21
Country Customers	60	114,892.16
Foundry Material	70	26,283.29
Woodworking Material	72	9,151.52
Factory Material	74	71,851.55
Supplies	76	8,642.19
Raw Castings	80	9,478.14
Finished Parts	82	16,721.98
Finished Product	84	21,432.45
Goods in Process		
Department 1 Material	310	38,437.19
" " Labor	312	26,129.32
" " Expense	314	14,218.64
" 2 Material	320	27,528.19
" " Labor	322	26,942.18
" " Expense	324	13,684.19
" 3 Material	330	19,416.98
" " Labor	332	22,118.69
" " Expense	334	11,982.14
" 4 Material	340	23,219.10
" " Labor	342	33,928.27
" " Expense	344	22,814.18
Office Furniture & Machinery	400	2,817.90
Salesroom Fixtures	402	1,682.45
Factory Machinery	404	164,289.17
Shafting, Hangers & Belting	406	18,928.74
Local Transport	408	7,819.42
Patterns	410	85,436.86
Small Tools	412	928.16
Motor Trucks	414	8,200.00
Real Estate	430	216,000.00
Buildings	432	114,620.00
Patents	440	31,651.94
Goodwill	442	129,256.41
Insurance paid in advance	450	1,847.19
Stationery and Printing	452	428.65
Advertising in advance	454	2,640.00
		$1,624,118.43

Digitized by Google

Liabilities and Capital

First-Mortgage Bonds	501	$ 100,000.00
Debentures	503	50,000.00
Notes Payable	511	75,653.19
Accounts Payable	513	36,846.81
Accrued Labor	515	9,642.84
Reserves		
Taxes	551	1,234.20
Interest on Investments	553	6,132.80
Experimental	555	1,119.24
Over, Short, and Damage	557	922.84
Variation of Weights and Measures	559	619.80
Factor of Safety	561	247.92
Maintenance	563	845.14
Depreciation	565	16,742.19
Sinking Fund	567	26,845.00
Bad Debts	569	9,419.27
General Loss and Gain	603	62,847.19
Capital Stock	605	1,000,000.00
Impairment and Surplus	607	225,000.00
		$1,624,118.43

or auxiliary records are merely the analysis of what appears in the General Exhibit, and must—as the sum of the parts must equal the whole—always articulate with and, as to totals, agree with, the General Exhibit, which contains the controlling accounts.

The General Exhibit has numerous columns, but it does not at all follow that every line must show an entry in every column. Quite the contrary, as it frequently happens in actual practice that on a particular page a number of columns will have no entries at all, the footings carried forward to the succeeding folio being the same as those brought forward from the preceding folio.

At the end of each month or period the General Exhibit should be closed, as later described, by balancing the various controlling account columns after all charges

Digitized by Google

and credits have been made, or, in other words, after all current entries have been made. The footings of the "Loss and Gain Accounts" columns are transferred to the Private Ledger column of the Exhibit by a closing entry, thus absorbing the difference between the two columns, which would otherwise appear as a balance. The assets and liabilities balances are then carried forward to the next folio and constitute the starting figures for the succeeding period.

Opening the Exhibit

In opening the Exhibit for the first time, it is quite advisable that each item of the balance sheet be shown therein to the end that the records may be susceptible of a quick and ready audit at any future period without reference to a detached document, such as a balance sheet form or an auditor's report. By showing the opening entry in full, the record is then complete in itself.

In the case of opening entries for subsequent fiscal years, after the Exhibit has been in use the need of such a complete display is not so pressing, yet at times it may appear to be the part of wisdom to display it. When all items are not so displayed, the carrying-forward of balances will be precisely the same as that shown in Chapter VIII under the caption, "Closing the Exhibit."

To provide for the student concrete examples embodying the fullest meaning of the various groups of columns in the Exhibit an actual balance sheet has been selected for showing the opening entries. The preceding figures are from the balance sheet of a high-class plumbing goods manufactory, arranged

Digitized by Google

according to the grouping, symbols, etc., of the chart of accounts, Figure 9.

Figure 11 shows the method of displaying the foregoing balance sheet on the General Exhibit. It will be noticed that this form is displayed in one long expanse without any division to indicate the binding space and without cognizance of long and short leaves, as described in the opening section of the present chapter. The purpose of this is that the student may concentrate his thought on the accounting features entirely without any interference by reason of the mechanical features involved in a foreshortening of the pages. In the operation of the book the effect is the same in both cases; i. e., lines 1, 2, 3, 4, etc., carry all the way across the folio, whether the book be bound as single pages (Figure 11) or be equipped with one or more short leaves as previously explained.

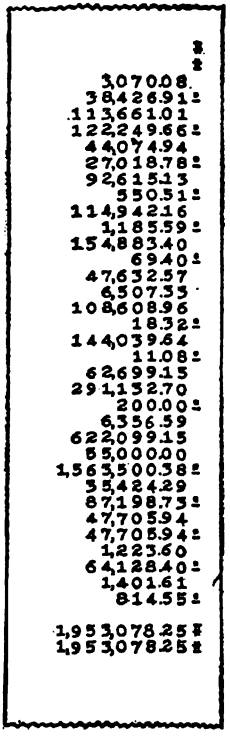
Each fifth line is shown as a heavy line, and in machine-ruled forms these are usually shown as alternating red and blue lines down the folio. They are known as "guide lines" and are an aid to the eye, enabling the person concerned to jump from one portion of the folio to another with only a mental memorandum that, for example, line 18 is two above the red line or that line 24 is one above the blue or whatever the exact colors or exact location may happen to be.

In connection with the opening entries reference is made to the chart of accounts, Figure 9, which, it will be seen, by means of certain features explained in the upper left-hand corner thereof, gives explicit directions as to the placing or location of items. Taking the items in the order of their precedence, the reader can follow the entries.

Digitized by Google

"Active Assets Group" Entries

"Imprest fund," being a practically undisturbed charge, is usually posted to the "assets" group in the Private Ledger. In this case the entry appears on line 1 and is so handled. In cases where concerns have considerable outside work and, in consequence, a number of separate "imprest funds," it is quite usual to have a specific "imprest fund" group in the Exhibit as a controlling account. An example of this need is an elevator works which has construction work going on in all parts of the country and is, therefore, required to have out, at all times, a considerable amount of working capital.



	$
	¢
3,070.08	
38,426.91	¢
113,661.01	
122,249.66	¢
44,074.94	
27,018.78	¢
92,615.13	
550.51	¢
114,942.16	
1,185.59	¢
154,883.40	
69.40	¢
47,632.57	
6,507.33	
108,608.96	
18.32	¢
144,039.64	
11.08	¢
62,699.15	
291,152.70	
200.00	¢
6,356.59	
622,099.15	
85,000.00	
1,563,500.38	¢
35,424.29	
87,198.73	¢
47,705.94	
47,705.94	¢
1,223.60	
64,128.40	¢
1,401.61	
814.55	¢
1,953,078.25	¢
1,953,078.25	¢

Fig. 13.—Adding Machine Strip of Interim Footings

"Current Cash," "Bank No. 1," and "Bank No. 2" are grouped under the one entry "Cash" on line 2, the amounts of each being placed in the respective special columns of corresponding caption. In Figure 9 it will be seen that these accounts appear in capitals, indicating the presence of special columns in the Exhibit.

"Notes receivable" is shown on line 3, and the amount is allocated in the "assets" group of the Private Ledger. There are many cases where the "notes receivable" item is so large, or so important, or so fluctuating in total value that a special group is an advantage. A special control is quite imperative where the sales of the

Digitized by Google

concern involve extended payments secured by promissory notes, as, for instance, in the piano business. Quite often a further segregation is made and kept in a special group of columns, showing notes which have been hypothecated but in which the company still have a contingent liability. In this latter case the opening entry would show on the debit side of the group the face value of the notes and on the credit side the amount which had been advanced upon them. In this way the contingent liability in the entire list of notes would be indicated, where if merely the difference between the debit and the credit side were shown, it would present a single item of somewhat questionable statistical value. In carrying forward these "sold notes" from month to month, the paid notes should be eliminated and the amounts forwarded should represent only the outstanding values involved. "Secured funds," shown on line 4, is an item to all intents and purposes like that of "notes receivable," and the same rules apply.

Customers accounts.—In this particular concern there are in fact eight subdivisions of customers, namely A to F, G to L, M to R, and S to Z in both city customers and country customers; but in the example only two subdivisions are made on line 5, a total of city customers and a total of country customers. For some concerns it may seem advisable to carry an individual controlling account for each of the eight, more or less, separate ledgers that may be used, and in other cases the space in the Exhibit might be economized to some extent and yet have full controlling information by means of subsidiary accounts. This plan is convenient, providing the records of original entry show the necessary segregation of the items for the various ledgers or that the columns be *analyzed* after the manner described in con-

Digitized by Google

Friday Feby 18th 1916

NAME OF ACCOUNT	ACCT NO.	ACCT NO	TOTALS FOR DAY Dr.	TOTALS FOR DAY Cr.	TOTALS TO DATE Dr	TOTALS TO DATE Cr.	BALANCE
Current Cash	10	10	1,600.02	1,600.02	51,397.41	51,397.41	
Bank No. 1	20	20	1,600.02		125,880.30	122,249.66	3,630.64
Bank No. 2	22	22			44,824.30	27,018.78	17,805.52
City Customers	50	50	3,842.97	604.95	106,287.94	9,313.52	96,944.42
Country Customers	60	60	2,814.62	969.19	143,381.76	14,304.28	129,077.48
Stores	70	70	927.14	18,660.15	154,885.40	19,729.55	135,155.85
Stocks	80	80		23,396.70	128,345.90	47,043.88	81,302.02
Accruing Mfg. Expense	100	100	962.14		2,310.77		2,310.77
Material in Process	310	310	42,094.71		180,703.67	24,307.94	126,395.73
Labor in Process	312	312	2,327.19		153,748.79	33,629.93	120,118.86
Overhead in Process	314	314			62,699.18	24,133.76	38,565.37
Equipment	400	400			291,132.70	200.00	290,932.70
Suspense	450	450			4,756.59	27.60	4,728.99
Various Assets	430	430			622,099.15	5,862.50	616,236.65
Various Liabilities	500	500			55,000.00	1,563,500.38	1,508,500.38
Accounts Payable	512	512		927.14	33,549.29	87,198.73	53,649.44
Accrued Labor	514	514		2,327.19	47,705.94	58,960.44	11,254.50
Reserves	550	550			3,102.52	64,244.65	61,142.13
Commercial Costs	700	700	32.12		1,816.48		
Cost of Goods Sold	800	800			23,647.18		
Revenues	900	900		4,657.59		64,920.21	
(Apparent Profit)							39,485.58
			56,200.93	56,200.93	2,218,043.24	2,218,043.24	1,672,003.00 1,672,003.00

FIG. 14.—Daily Report—Master and Slip Sheets

Digitized by Google

nection with Figure 16, "others accounts" column (page 130).

"Passive Assets Group" Entries

The "stores and stocks" entry on line 6 comprises "foundry material" (70), "woodworking material" (72), "factory material" (74), "supplies" (76), "raw castings" (80), "finished parts" (82), and "finished product" (84). Of these the first four items are classed as "raw stores" and therefore appear in the controlling column of that caption; and the latter three items are classed as "stocks" (material upon which labor and overhead has been expended) and are shown in the "stocks" group. The allocation of the items in the columns as shown is self-explanatory; but in connection with this particular entry, it will be noticed that the figures encroach upon the lines of other items bearing no particular relationship to the present items. This is an example of economy of space. Theoretically the "stores and stocks" entry should take up lines 6 to 14 inclusive. In actual practice, however, it will be observed that the more lines that are used, the more frequent will be the need of carrying forward folio footings, which, as far as practicable, should be minimized. In practice, therefore, figures can be injected into any available space, provided the meanings of the entry are kept positively clear and do not obscure the meaning or character of any other entry. In this case it was clear that nothing whatever was present in the "raw stores" column; hence that space was available for the first five items. By having the entire balance sheet spread before the accountant, it was also apparent that the last three items would not conflict with the

Digitized by Google

entry for line 7; hence the entry could clearly be made as it is shown. If the entry for line 7 had not been previously known, either the entry could have been made as it is on a chance and if necessary the next entry started on line 9, or the three amounts could have been shown on lines 3, 4, and 5 respectively, and the account numbers 80, 82, and 84 in connection therewith shown in the symbol column under "Accruing Manufacturing Expense."

In whatever way an encroaching entry of this kind is made, a bracket should be drawn embracing all the figures involved and showing the point of the bracket opposite the line on which the entry properly belongs. This is essential from the fact that it sometimes becomes necessary to check back entries when a folio is out of balance and the error or oversight has to be located. Incidentally a better medium for detecting errors can hardly be evolved than the General Exhibit, which has in itself the proof-by-balance feature focused down to individual folios.

"Goods in process" items, shown on lines 7 to 10 respectively, are allocated under the three cost elements represented by columns, namely, "Material," "Labor," and "Overhead." This subdivision is slightly more than the chart shown in Figure 9 indicates, the latter showing but one controlling account with "goods in process." This, however, is an example of the latitude of expansion and contraction possible in practice in the planning of General Exhibits. No column is shown in this group for symbol numbers; if it appears essential to show such reference, they may be shown small in some nearby space (after the manner shown opposite the "overhead" item on line 7), this being so indicated as positively

Digitized by Google

Digitized by Google

K No. 2

	Cr.
30	27018
	17809
30	
	44824

Digitized by Google

to avoid any confusion or mistakes of including the reference figures as having financial values.

"Office fixtures and machinery" (400), "salesroom fixtures" (402), "factory machinery" (404), "shafting, hangers, and belting" (406), "local transport" (408), "patterns" (410), "small tools" (412), and "motor trucks" (414) appear on lines 11 to 18 inclusive and are allocated in the "Equipment" group with the corresponding symbol number shown opposite each item. The use of a separate group for "equipment" is not absolutely essential in all cases, but can be embodied with the "assets" group of the Private Ledger when so desired.

"Various Assets Group" Entries

"Real estate" (430) and "buildings" (432) are embodied in one item, "fixed assets," and entered on line 19, with an encroachment on to line 18, with a bracket as hereinbefore explained, the same thing being done in the case of "representative assets," which encroach on line 21. "Patents" (440) and "goodwill" (442) constitute the "representative assets."

"Deferred charges," or what are called "suspense" items, are shown on line 21, and an encroachment is made on lines 22 and 23, with a proper bracket about the figures for "insurance paid in advance" (450), "stationery and printing" (452), and "advertising in advance" (454).

"Liabilities Group" Entries

"First-mortgage bonds" (501) and "debentures" (503) are grouped under the item "bonds" and appear

Digitized by Google

on line 22, with an encroachment on line 23, properly bracketed.

"Accounts payable" as entered on line 23 consists of "(creditors) accounts payable" (513) and "(pay roll) accrued labor" (515), each of these classes having a separate control group into which the items are allocated.

"Notes payable" (511) appears on line 24 and is listed under the "liabilities" group of the Private Ledger. Like "notes receivable" this amount is sometimes sufficiently important to demand a separate display in a group all its own.

The "reserves" items listed in the balance sheet are grouped in one item on line 25 and stated as "deferred credits." These are all separately listed by amount and symbol number in the "reserves" group, with an encroachment on lines 16 to 24 inclusive, being properly bracketed. In this case as no figures appear to the right of the "reserves" columns on lines 16 to 25, there is no real need of a bracket at the right-hand side of the figures; hence none is shown. In two of the items it was necessary to crowd the amount into a neighboring column. In devising a book care must be exercised to provide sufficient space for given requirements, yet in a large book the space cannot be extravagantly used without making the book cumbersome. At times a little crowding has to be resorted to on almost any book, but when the lines are in colored ruling inks, the black-ink entries over them do not convey the impression of crowding quite as much as is apparent in the present all-black form.

The last three items, "general loss and gain" (603), "capital stock" (605), and "impairment and surplus"

Digitized by Google

Digitized by Google

Digitized by Google

(607), are entered respectively on lines 26, 27, and 28 and are all allocated in the "liabilities" group under the Private Ledger heading.

With all the entries made as stated, the various columns are footed, the debit footings being shown on the upper footing line and the credit footings on the lower line. On the adding machine the cross footing will then show as follows:

$ 1,827.19	$1,513,500.38
41,419.28	36,846.81
28,642.71	9,642.84
92,614.21	64,128.40
114,892.16	
115,928.55	$1,624,118.43
47,632.57	
108,601.46	
109,118.46	
62,699.15	
290,102.70	
4,915.84	
605,724.15	
$1,624,118.43	

Footings should not be first made in ink, as when that is done, through the irony of fate, almost invariably some little difference will necessitate erasures. Make the first test in pencil, and when the folio has been proved, mark it O. K. (as indicated in lower right-hand corner), and then be sure that the footings are carried forward to the next folio without error.

Digitized by Google

CHAPTER VII

CURRENT EXHIBIT ENTRIES

Order of Entries

Figure 12 represents folio 2 of a General Exhibit record, showing current entries. Let it be understood that a folio similar to this in a regular bound book after this plan would have perhaps sixty entry lines, whereas the present figure shows but thirty entry lines. Moreover, this figure purports to show entries covering eighteen days of a calendar month, whereas in actual practice the entries of a fair-sized business during that period might cover three or four times as many lines on the General Exhibit. The entries here shown are picked at random, in order that a number of different transactions might be recorded in more or less concise form; furthermore, recurrence of the same kind of entries is shown in order to set up the semblance of correct detail, which, in fact, does not exist on this condensed form. A certain amount of daily routine entries must be assumed; as, for instance, Check Register, sheet 2, would, in the ordinary course of events, be entered between the entry of Check Register, sheet 1, on line 6, and sheet 3, on line 11, and deposits would be made practically every day instead of only seven times in a period covering more than half a month. In short, this illustration does not essay to cover all entries probable in the given time nor is it likely to

Digitized by Google

Digitized by Google

Digitized by Google

present what would be considered a well-equalized statement at any interim period, as will be noticed in scrutinizing what represent pencil footings under line 21, taken to test the equilibrium of the folio at that point. A regularly employed General Exhibit would present a full and complete statement of the business at any point where all subsidiary records were entered; this illustration is intended to demonstrate the principles that make that fact possible.

Exchequer Accounts

The "current cash" group under "Exchequer" represents merely the transitory stage between receipts of money and the deposit of such money in the bank. As the individual Cash Receipts Sheets (Figure 16) carry the details of these transactions, this group in the General Exhibit is a control only and is of no particular value beyond that. Reference is not made to it for a daily cash balance, and its main and only function is exercised at the end of the month only. It receives credit by way of deposit entries before it shows as having sufficient money to deposit, the charges it receives coming only with the entry of the Cash Receipts Sheets as they are completed and ready for entry. In many cases where the General Exhibit is employed, the deposit entries are not made in the Exhibit at all, but are made in the memoranda column of the Cash Receipts Sheet (Figure 16). In most cases this memoranda column totals to the same amount as the "Cash" debit column does, but if it does not, it equalizes itself possibly at the end of the next sheet. If it does not so equalize itself at the end of the month, there must be a balance

Digitized by Google

carried over to the succeeding month, just as was the case in the opening entry on line 2 of Figure 11. In actual practice, where all receipts of cash are deposited intact, it is but seldom that such a balance is carried forward, as the quite usual practice is to enter such receipts of cash as may come in after banking hours on the last day of the month and to deposit them on the first day of the succeeding month as of the preceding date. In fact, some pursue the erroneous plan of considering two or three days of the succeeding month as of its preceding month, under the hallucination that a better showing of collections is being made. This might be so were it not repeated every month successively.

Where deposits are entered from the Cash Receipts Sheet, the entries in the Exhibit differ slightly in that, aside from the debit to Current Cash, there is also a credit to Current Cash and an offsetting debit to one or both of the banks, as the case may be. The question naturally arises as to the need of the "current cash" group, yet every time the author has been persuaded to omit it, frequent needs for it have seemed to arise, with the result that a more or less awkward entry of the cash on hand had to be carried to the "various assets" group and posted to a ledger account followed by a similar entry in the succeeding month, crediting it out of the ledger account and transferring it to a bank account. Where a "current cash" group is present, the Private Ledger Account under the caption "Current Cash" is used to show the totals of monthly entries for statistical purposes; thus the total debit during the month and the total credit during the month will not only show up any undeposited balances on hand, but from beginning to end of the year the account will be

Digitized by Google

cumulative and will be of value as a record. This condition obtains also in the case of the banks.

In the "banks" groups the exact status of any of the individual bank accounts cannot be determined unless all deposits are shown and all Check Register Sheets entered, or, if not positively entered, taken into consideration. In some concerns both Cash Receipts and Check Register Sheets are closed with each business day and the totals carried to the General Exhibit, in which case the showing of the Exchequer is complete. In other concerns pencil footings are made at the close of each day and shown in the Exhibit in pencil until such time as the sheet is filled and actually transferred to the Exhibit, when the positive ink figures supersede the pencil memoranda figures.

In order to make controlling accounts show accumulated totals properly for statistical purposes, it is quite essential that an overplus of debits, due to errors or omissions, be diminished by a red ink credit in the debit column, rather than by a regular black ink credit, which would have the effect of showing the total debit larger than it was in fact; this applies also to the credit side. An example of this can be understood if it be assumed that the adjustment entry on line 19 appeared in red ink instead of black ink. If the pencil footing just below line 21 were to read $122,248.66, it would not properly articulate in the calculations incident to a reconciliation of the bank's statement or "balanced" pass book. The addition of $1.00 in the correcting entry makes it what it should be. Conversely, if the error had been the other way and the footing $122,250.66 before the correction was made, it still would be "out" in the bank account reconciliation until $1.00 was deducted. If the $1.00 were to be shown on the debit side in

Digitized by Google

RECORD OF GOODS ORDERED

Date 1916		Order No.	Ordered From	Lumber	Hardware	Metal	Paint	Mfg Expense	Sundry	Total This Day	Total This Month	Date Received		Remarks
Jany	3	2530	Levy Bros			1000 00						Jan	22	
		1	Madison Box Shook Co						100 00				18	
		2	Rogers Brown & Co			18000 00						Feb	8	Approximate Cost
		3	H. R. Snyder & Co				14500 00			23600 00	23600 00	Jan	20	
	4	4	Edw. Hines Lbr. Co	3000 00								"	27	Approx.
		5	Kaestner & Hecht Co						2000 00					Delivery in March
		6	Elmer R. Klaus & Co		18000 00									1/3 Feby-Mar-Apr
		7	Temple Mfg. Co						2800 00	25800 00	49400 00			
	17	2761	Levy Bros & Co			92 40						Feb	5	
		2	Alfred Forrest					250 00						
		3	Edw. Hines Lbr. Co	2500 00						2842 40	52242 40			Approx.
			[illegible]		[illegible]									
		88	Lester Harkness & Co	2000 00										
		9	Madison Box Shook Co						100 00	6425 00	89642 00	Feb	7	
			Forward	10800 00	22695 00	24680 00	17900 00	4760 00	9800 00					

Fig. 18.—Record of Goods Ordered

Digitized by Google

black, the net result would be the same, but the totals would show the bank as having received $1.00 more in deposits than actually happened.

Subsidiary Records

While this book is so arranged that all entries of any kind whatsoever could, if desirable, be made in it, subsidiary records are, for obvious reasons, resorted to. In these subsidiary records the motive is centralization of data along lines of least resistance; entries can be classified into such groups as seem advisable and records maintained under each of such segregations, bringing net results thereof to this central controlling record. As examples of these we have Receipts of Cash (Figure 16), Disbursements of Cash (Figure 17), Purchase Analysis (Figure 19), etc., which are in fact but outgrowths of certain columnar groups of the General Exhibit and may be considered like subagencies under a general agency.

On lines 6 and 11 appear entries of Check Register Sheets; on line 19 appears a correcting entry for a hypothetical error in the Check Register, sheet 1. The principal controlling accounts involved in the Check Register are the Banks, Accounts Payable, and Discount on Purchases; by reference to Figure 17 it will be seen that columns are provided for these, making it but a simple process to copy the totals of the columns into the General Exhibit. In the case of debits and credits of groupings other than here mentioned, the items appear (Figure 17) in an "Other Accounts" column and are analyzed into groups to fit the columnar grouping of the General Exhibit. This analysis is more fully

Digitized by Google

described in Chapter IX. In entering such analyses certain items may be totalized if desired, but it is more susceptible of a quick and ready audit if various items are clearly shown. As for instance on line 7, in the last column, appear two items, $167.17 and $237.19; these could be shown in the Exhibit as $404.36, but in any future checking-back process (with Figure 17) it would be annoying to determine just which items made up the $404.36, particularly as the $167.17 item comes from the discount column and the $237.19 from another place, several columns away.

On line 9 appears a Purchase Analysis entry in connection with Figure 19; the same conditions obtain in connection with this that already have been described concerning the Check Register Sheets. Cash Receipts Sheets entered on lines 8, 26, and 29 may also be considered in this category. There are one or two points in addition; on line 9 the Purchase Analysis shows an encroaching entry such as described in Chapter VI; so also does the Cash Receipts Sheet on line 26. On line 25, in connection with line 26, appears a credit in a debit column. In actual practice this item of $4.05 would appear in red ink, a common method for showing a credit in a debit column, or a debit in a credit column. When this item is approached in footing the column, the amount is subtracted instead of added. Another example of this occurs on line 21 at the right-hand side of the form.

Labor Cost Summary Sheets (Figure 80) may possibly be compiled each day or once or twice each week, as conditions in individual plants may seem to make it expedient. The entry in the General Exhibit may be made from individual sheets or may be accumulated possibly on weekly summary sheets from which the

Digitized by Google

Digitized by Google

Entry Date 1916		Line No.	Purchased from	Order No.	Rec'd Shipm't
Feby	3	1	Fred R. Sargent & Co. Insurance	2756	
	4	2	Levy Bros & Co. Brass parts	2761	
		3	Geo. F. Reed Coke Co	2753	
	5	4	Thos Preston Cshr. Imprest Voucher	—	
		5	Brown & Melhope Pat. Attys	—	
		6	Jay Rossiter & Co.	2768	
		7	Frankel and Peterkin	2781	
		8	Robt Johnson Contracting Co	—	
		9	Lester Harkness Co.	2770	✓
		10	Wisconsin Sign Co - Advertising	2769	
	7	11	Rogers Brown & Co.	2532	
		12	Edw. Hines Lumber Co.	2763	
		13	Miller DuBrul and Peters	2786	
		14	R. Dun & Co.	2791	
		15	Madison Box & Hook Co.	2789	✓
		16	Erie R.R. Co. - Frt settlement	—	
		17	Amer Mech Calculator Co.	2758	
		18	Theatrical Program Co.	—	
	8	19	Pay Roll	—	
		20	Cincinnati Milling Mach. Co.	2765	
		21	Fred Johnson Die Works	2783	
		22	Robt Johnson Contracting Co - Roof	2767	
		23	Empire Water and Light Co	—	
		24	Emery Cotton Co.	2785	
		25	Hinde & Dauch Co. Cartons	2749	
		26	William Gordon Steel Co.	2754	
		27	Reed Mach Co - Repairing Donkey Engine	2746	
		28	Frankel & Peterkin - Cr Memo	—	
		29	Rudolph Wiedemann	2759	
		30	Donald McCready	2751	
—					

Digitized by Google

amounts involved may be transferred to the General Exhibit. Line 22 shows a typical entry of a single Labor Cost Summary. The same thing is true also of Material Cost Summaries (Figure 47), as shown on line 28. This entry involves an encroachment such as has been described in preceding sections.

In some plants it is customary to enter in the General Exhibit all Production Register Summaries as the production orders listed thereon are finished, while in other plants a summary is made only at the close of the month. On line 23 appears the entry of an interim summary, presumably embodying all the sheets up to that point where the orders involved had been finished. It may be said in connection with Production Registers that the wide difference of forms in use makes it quite impossible to select a typical example to fit all classes of production. Bakery product is started and finished within twenty-four hours; hence each day's record is complete in itself, whereas the class of production shown on Figure 19 may cover a period of four months or even more.

An interim Sales Summary entry is shown on lines 24 and 25, the first line being the transactions with the customers and showing debits to City and Country Accounts Receivable respectively and credits to revenue accounts. The second line, involving the cost prices of the articles sold, gives debits to the operating account called, "Cost of Goods Sold," and credits, at cost price, to the Stocks Account. Records of this kind are much more simple to compile chronologically, as they usually involve only adding-machine listings of manifold invoice copies or some modern short-cut plan whereby statistical information is evolved, geographically, territorially, departmentally, etc. Under

Digitized by Google

such conditions daily, weekly, or monthly entries to the General Exhibit may be made as desired.

Types of Cross Entries

The first entry of Figure 12 is a deposit shown on line 2. In the practical operation of the General Exhibit it is not absolutely necessary to give an entire line across the page to the entry of the deposit each day, for the reason that the cash and bank columns are in juxtaposition and figures entered therein are self-evident of their purpose, hence a deposit entry of the same date, provided this other entry does not use the deposit column. For example see line 22, where a deposit is "injected." This might have been done with economy of space in the case of lines 5, 15, 18, 27, and 30. Nor, indeed, is it absolutely essential that every entry on a line be of the same date, if the proper date be interlined immediately before or after the figures of the amount of the deposit. This suggestion is a departure from theoretically correct practice and is only allowable as a measure of possibly needed economy and when it does not tend toward obscurity in any entry to even a slight degree. In order to avoid confusion of the entries on line 22, the amounts having to do with the deposit are enclosed in parentheses, not only those in the "Current Cash—Cr." and the "Bank No. 1—Dr." columns, but also the exchange amount in the "Commercial Costs—Dr." column near the right-hand edge of the form.

As will be shown in chapters following, when stores and stocks are subjected to actual physical inventory and "overs" or "unders" are found to exist upon comparison with the Stores Ledger accounts, such ledger

Digitized by Google

Digitized by Google

Digitized by Google

accounts must be made to agree with the physical facts. To do this requires an adjusting entry absorbing the differences into the reserve account called "Variation of Weights and Measures." On line 3 is shown such an adjustment. Let us suppose that a number of sizes and shapes of nuts are involved and that a list of differences has been compiled (Figure 48). The individual Stores Ledger cards, or pages, will receive charge or credit from that list, while the controlling account need receive but the one item embodying the net difference. In the example this is done by crediting Stores with $69.40 and charging account 558 with the amount in the "Reserves" column, where it properly belongs.

Under any plan of records there is always more or less nuisance surrounding what are known as "contra accounts," which in ordinary bookkeeping parlance means that one man or concern is both a buyer and a seller and that in consequence an account will appear in both the Sales Ledger and the Purchase Ledger and must by some means be merged into one settlement. Some concerns who are in a position to dictate conditions will not be bothered with transfer entries of this kind but insist upon the regular handling of each transaction; i. e., each purchaser pays for his own purchases in money or check. Where no credit risk is involved, this is the ideal plan to follow, but where it is desired to make a settlement and clean up both accounts, it can be done by an entry as shown on line 4, wherein $75.42 is credited to a country customer and charged to an "Account Payable." In such an entry as this both items are posted from this entry to the various individual accounts involved.

The discounting of a note at the bank or elsewhere, is sometimes recorded on the Cash Receipts, which is

Digitized by Google

wrong in principle. That form should be reserved for collections of moneys belonging to the business, which in the ordinary course of events passes through "current cash." Bank discounts do not pass through "current cash," and technically such discounts are never received *like* cash but are credits given by the bank against which the manufacturer may draw checks as he desires. When included as a cash receipt, a bank discount creates fictitious statistics where monthly totals are considered, unless such be first deducted, which makes unnecessary work. The easier, quicker, more accurate way, and in fact the record nearest to the exact physical facts, is as shown on line 7; the bank is given debits for the net amount of what bankers term the "discount"; Notes Payable (511) is given credit for the face of the note; and the interest is charged to the Interest Account (552) under "Reserves" under a plan more fully discussed in Chapter XVIII.

Figure 51 shows a defective work report, which is fully explained in Chapter XVI. There is, however, no special form shown in the present volume, upon which the figures from these reports are collated or summarized, as usually no special form is required and an adding machine strip or sheet which becomes a matter of permanent record well serves the purpose. Line 10 shows the entry of a hypothetical summary, giving credit to "goods in process" group for spoiled work, divided into Material—$18.32 and Labor—$11.08, and charging the net loss to Over, Short, and Damage (556) under the "reserves" group. Line 12 shows the transfer of a "doubtful" or "'desperate" account from a current "Country Accounts Receivable" Ledger to the Reserve Account for Bad Debts (568).

Lines 13 and 14 show an adjusting entry in a matter

Digitized by Google

over which there may possibly have been considerable correspondence pass. Cross entries should always have sufficient explanation to enlighten those who are entitled to information. Cold, blind entries are equally as exasperating to an auditor if found on an Exhibit as if found on an ordinary Journal. In this instance an authority is shown; also reference is made to existing correspondence on the subject. The net result of the transaction is that the customer has credit passed to his account, the amount $127.19 being absorbed in Freight, Express, and Drayage—Outbound (712) in the "commercial cost" group.

Lines 16 and 17 show an entry that might be brought about by almost any reason even up to that of forcible seizures of the goods without process of law. The example is merely to show the acquisition of goods by other than the usual routine Purchase Analysis (Figure 19) entry.

Lines 19 and 20 show simple entries covering adjustments of errors in subsidiary records.

Line 21 shows what might occur if a number of long-standing small credit balances had been carried in the "City Accounts Receivable" and were finally closed out. The entry passes credit to Allowance for Bad Debts (707) in the "commercial cost" group. Properly this entry should show in the "descriptive" column in a list of the customers accounts directly affected or in a reference to such a list elsewhere.

In posting analytical ledgers or in analyzing expense items, it is always conducive to the best results to work from the General Exhibit. Take for example the "Accruing Manufacturing Expense" column; the first item, $69.14, coming from Check Register, sheet 1, can

Digitized by Google

be analyzed by reference to that Check Register Sheet, after which the $69.14 can be checked with a clear, full, ink check mark, indicating that it has been taken care of. In like manner succeeding items can be handled, and

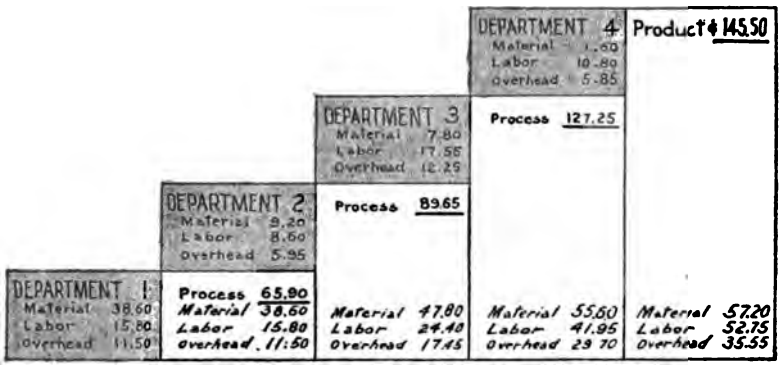


Fig. 21.—Diagram Showing Increase of Manufacturing Costs by Departments

at last when all items are checked, it is reasonably sure that the analysis will articulate with the synthesis. Where original entries occur on the Exhibit, there is, of course, no need for reference to any other record so long as symbol numbers are present, unless, perhaps, it be to an authority as shown on lines 13 and 14.

Summary of Entries

(All hypothetical unless otherwise stated.)

Deposit		
Bank No. 2	$ 3,620.10	
Collection Charges (704)	.90	
Current Cash		$ 3,621.00
Line 3 (Figure 48)		
Inventory of Nut Shed		
Reserve for Variation of Weights and Measures (558)	69.40	
Factory Material (74)		69.40

Digitized by Google

Line 4		
Cross Entry		
Accounts Payable	75.42	
A Country Customer		75.42
Line 5		
Bank No. 1	7,491.53	
Collection Charges (704)	.65	
Current Cash		7,492.18
Line 6		
Check Register, sheet 1		
Stores	641.38	
Manufacturing Expense	69.14	
Accounts Payable	22,104.28	
Accrued Labor	9,642.84	
Bank No. 1		9,628.83
Bank No. 2		22,418.62
Discounting Purchases (907)		410.19
Line 7		
Bank No. 1	49,250.00	
Reserve for Interest (552)	750.00	
Notes Payable (511)		50,000.00
Line 8		
Cash Receipts, sheet 1		
Current Cash	1,242.89	
City Customers		302.21
Country Customers		940.68
Line 9 (Figure 19)		
Purchase Analysis, page 14		
Foundry Material (70)	11,099.69	
Woodworking Material (72)	5,067.75	
Factory Material (74)	21,675.31	
Supplies (76)	159.20	
Manufacturing Expense	3,219.19	
Material in Process	7.50	
Labor in Process	34,921.18	
Equipment	950.00	
Suspense	525.75	
Assets	9,875.00	
Reserves	260.00	
Commercial Costs	645.20	
Accounts Payable		50,342.67
Accrued Labor		38,063.10

Digitized by Google

Line 10		
Reserves for Over, Short, and Damage (556) ..	29.40	
Material in Process		18.32
Labor in Process		11.08
Line 11 (See Figure 17)		
Check Register, page 3		
Country Accounts Receivable	50.00	
Stores	52.97	
Manufacturing Expense	3,219.00	
Equipment	80.00	200.00
Suspense	915.00	
Assets	6,500.00	
Notes Payable (510)	55,000.00	
Accounts Payable	13,244.59	
Accrued Labor	38,063,10	
Reserves	72.50	
Commercial Costs	627.19	
Bank No. 1		112,619.83
Bank No. 2		4,600.16
Discounting Purchases (906)		167.17
Sales of Raw Material (901)		237.19
Line 12		
Reserve for Bad Debts (568)	42.30	
A Country Customer		42.30
Lines 13-14		
Freight, Express & Drayage—Outbound (712)	127.19	
A Country Customer		127.19
Line 15		
Bank No. 2	11,812.13	
Collection Cost (704)	1.40	
Current Cash		11,813.53
Lines 16-17		
Woodworking Material (72)	248.30	
A City Customer		248.30
Line 18		
Bank No. 1	15,500.20	
Current Cash		15,500.20
Line 19		
Factory Material (74)	1.00	
Bank No. 1		1.00
Line 20		
Factory Material (74)	9.25	
Accounts Payable		9.25

Digitized by Google

Line 21		
Accounts Receivable	.92	
Discount Allowed (705)		.92
Line 22		
Bank No. 1	10,619.27	
Collection Costs (704)	1.65	
Current Cash		10,620.92
Line 22 (Figure 80)		
Labor Cost Summary, page 19		
Manufacturing Expense	1,545.35	
Labor in Process	9,709.15	
Accrued Labor		11,254.50
Line 23		
Production Register Summary, page 19		
Finished Parts (82)	16,432.19	
Finished Product (84)	64,281.14	
Reserve for Maintenance (562)	1,328.92	
Material in Process		24,289.62
Labor in process		33,618.85
Expense in Process		24,133.78
Line 24		
Sales Summary Sheet, page 129		
City Customers	13,642.81	
Country Customer	28,439.60	
Revenues		42,082.41
Cost of Goods Sold	23,647.18	
Stocks		23,647.18
Line 26 (Figure 16)		
Cash Receipts Sheet 3		
Current Cash	38,684.21	
Accounts Payable	125.00	
Manufacturing Expense	500.00	4.05
Reserves	550.00	116.25
Commercial Costs	44.81	
Discount Allowed (704)	226.09	
City Customers		1,483.94
County Customers		10,612.52
Suspense		27.60
Assets		5,862.50
Revenues		22,023.25
Line 27		
Bank No. 2	749.36	
Collection Costs (704)	.20	
Current Cash		749.56

Digitized by Google

Line 28 (Figure 47)		
Material Cost Summary, page 16		
Manufacturing Expense	962.14	
Material in Process	42,094.71	
Foundry Material (71)		6,918.12
Woodworking Material (73)		3,328.75
Factory Material (75)		9,413.28
Supplies (77)		962.14
Raw Castings (81)		8,642.32
Finished Parts (83)		13,792.24
Line 29		
Cash Receipts, sheet 4		
Current Cash	9,643.12	
Collection Costs (704)	142.12	
City Customers		7,279.07
Country Customers		2,506.17
Line 30		
Bank No. 1	1,600.02	
Current Cash		1,600.02
Totals	$593,929.78	$593,929.78

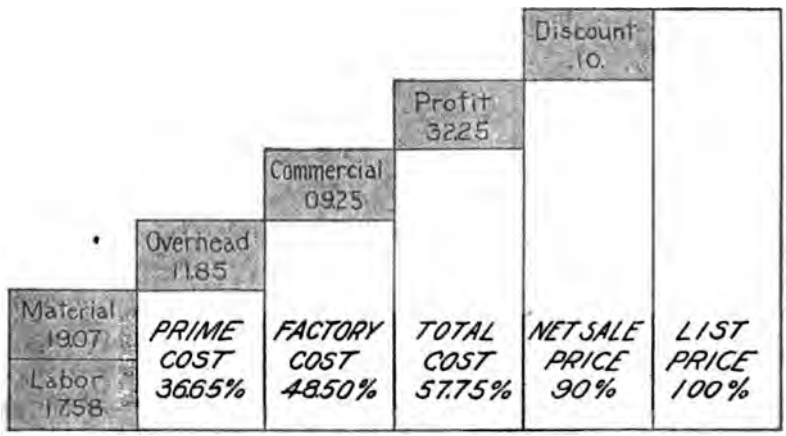


Fig. 22.—Diagram Showing Increase of Manufacturing Costs by Elements

Digitized by Google

Interim Statements

One of the main features of the General Exhibit is to produce or display that which its name implies—a general exhibit of the affairs of the business as time proceeds. Under all but most extraordinary circumstances, or where routine work is behind, a daily report can be laid upon the manager's desk each day, before noon, embodying the figures of the previous day's entries. This is accomplished by bringing down pencil footings after the manner shown immediately under line 21. Where any of the subsidiary records are but partially filled and are, therefore, not in such state or condition as to be entered on the General Exhibit, they can be pencil-footed and on the daily report treated as though actually entered on the Exhibit by combination with the Exhibit footings. This will present practically a "going" balance sheet of the business.

Proof of accuracy should be first tested on the adding machine, perhaps after the manner of the list on page 72 (Figure 13), taken from footings under line 21 on an adding device which is equipped to add two columns independently at the same time.

This expedites matters and reduces to the minimum the probability of annoying corrections in the subsequent use of the figures. In a machine-ruled book where debit columns have blue "down-lines" and credit columns have red "down-lines," it is not necessary to look up to a column heading to determine whether an amount should be listed in the upper counter or the lower counter of the duplex adder, as the color of the column lines will indicate it instantly. In the adding machine strip (Figure 13) it will be noticed that the items are listed as they appear in order, laterally across

Digitized by Google

Record of Machine Time and Production, Month of _____ 191_

Date	MACHINE No. ____ Preparation Time	Running Time	Quantity Produced	Indirect Time	Idle Time	MACHINE No. ____ Preparation Time	Running Time	Quantity Produced	Indirect Time	Idle Time	MACHINE No. ____ Preparation Time	Running Time	Quantity Produced	Indirect Time	Idle Time	Date
1																1
2																2
3																3
4																4
5																5
6																6
7																7
8																8
9																9
10																10
11																11
12																12
13																13
14																14
15																15
16																16
17																17
18																18
19																19
20																20
21																21
22																22
23																23
24																24
25																25
26																26
27																27
28																28
29																29
30																30
31																31
Totals																Totals

Fig. 23.—Summary of Machine Hours

Digitized by Google

the folio of the Exhibit, the debit footings being listed in the upper counter, which has no special indication, and the credit footings being listed in the lower counter which is indicated by (▪) a small solid square underlined. In the totals the upper counter has a line above the star ($\bar{*}$), and the lower counter shows a similar line below the star ($\underline{*}$).

The daily report shown in Figure 14 consists of a master sheet and a slip sheet so placed as to fit exactly the spacing of an unlimited split duplex adding machine, to the end that the slip sheet may be filled out on the adding machine. On the master sheet appear the typewritten names of the accounts or groups of accounts of the General Exhibit. On the slip sheet appear the figures. Together they may be made to give as complete a report of the business as desired, the plan permitting expansion or contraction. To accomplish this the master sheet having been prepared with the selected list of accounts is folded as indicated in the illustration, and the daily slip sheet, when supplied with figures, is placed in this fold. Used with the master sheet, the record is intelligible to anyone. Without the master sheet, the slip sheet is absolutely meaningless. Should it fall into alien hands, it tells nothing; but to him who possesses a duplicate of the master sheet or a knowledge of its arrangement, the slip sheet becomes at once an open book, giving in unmistakable terms all the information intended to be conveyed. The slip sheet is punched for permanent filing in a post binder. This plan is exceedingly advantageous where daily reports are sent from one office to another, as in the case of a branch office or where an official not present at the plant desires close touch with the affairs of the concern.

The figures selected for the illustration are those

Digitized by Google

appearing at the bottom of folio 2 of the General Exhibit (Figure 12). In the "totals-to-date" group (Figure 14) it can be seen that the figures compare exactly. The "Balance" column shows the net difference between the debits and the credits of each item listed under "Totals to Date." Having these three columns as shown, enables the recipient to make calculations and to draw conclusions of his own from his successive daily report sheets by taking cognizance of the items under "Totals for Day." In many instances where a close check of accuracy is desired at a place geographically, or otherwise, separated from the General Exhibit and its subsidiary records, these daily sheets are, in turn, entered in a record devised for the purpose of showing, chronologically, progressive and statistical information.

In the columns "Totals for Day" (Figure 14) the amounts will not, in every case, agree with items shown in the Exhibit under date of February 18. This is for the reason that in the case of Cash Receipts, sheet 4 (line 29 of Exhibit), the amount $9,643.12 was not all received on the date of February 18, and that hypothetically $8,043.10 of it was from previous pencil footings on the Cash Receipts Sheet, included in a previous day's report. The figures correlated to the latter amount then must have been as follows:

City Customer—Cr	$6,614.12	
Country Customer—Cr	1,538.98	$8,153.10
Discount allowed	———	110.00
Net Cash Received		$8,043.10

In the case of the Material Cost Summary shown on line 28, there would not be the same need for interim information as in the case of cash received, which is

Digitized by Google

quite often of vital importance. Material transfers involve conditions that forty-eight hours, one way or another, do not deeply affect so far as exact financial conditions are concerned. Whether $100.00 in material is shown under "Stores" or under "Material in Process" is of scant importance under ordinary conditions. Hence material cost summaries shown once, or twice, each week is sufficient. In large plants there usually are enough data accumulated daily to make a daily material summary expedient.

Interim footings on Labor Cost Summaries, Check Register Sheets, and Sales Summaries should be shown daily, but in this particular example it was not convenient to feature them.

Digitized by Google

CHAPTER VIII

CLOSING THE GENERAL EXHIBIT

Order of Entries

Figure 15 represents folio 3 of a General Exhibit record, showing the footings brought forward from folio 2 (Figure 12), and also the figures from certain hypothetical subsidiary records and two figures from illustrations (Figures 19 and 84).

There is no fixed order of precedence in making closing entries, save only for the last two entries, namely, the entry of Expense Distribution Sheet totals and the transfer of cost and revenue totals to the "Private Ledger" group of columns. These exceptions are for the reason that the preceding closing entries on the folio are all quite likely to affect either one or both of the last two entries, hence the precaution necessary to know first positively that all closing items are entered before taking the last final step.

Sales

On lines 2 and 3 appear totals from a hypothetical Sales Summary. The exact form of a Sales Analysis is not shown in the present volume, owing to the wide divergence of plans for such employed in present-day accounting. In the range from the old-fashioned and laborious pen entries in bound books to the latter-day adding-machine lists drawn from carbon copies of

Digitized by Google

invoices, there are many good methods and some poor ones. The exact method employed is of little consequence to the use being considered in the present examples, so long as the figures are quickly obtainable at the close of the month.

Aside from the amount of the sales, this Exhibit entry involves the recording of the cost of the goods sold. The means of arriving at such figures vary with the product. In some companies the carbon copy of the invoice is priced at cost price opposite each individual item and the total thereof is listed either by adding machine or by some other method whereby a grand total may be arrived at. In others a tally sheet is maintained whereby quantities are tallied for each different item of product; at the end of the month these tally marks are counted and the amount thereof multiplied by the cost price of the article, and later these extensions are summarized to arrive at a grand total of cost of goods sold.

In certain large companies where automatic sorting, listing, and adding devices are used in connection with perforated cards (Figures 35, 36, and 37) embodying data concerning sales, costs, product, commissions territories, etc., it is a very simple matter to arrive at totals of not only revenues and costs, but also a fixed classification of such by sales territories, individual salesmen, classes of customers, classes of product, etc. While these devices are used almost entirely by concerns having a very large volume of work, it is possible for smaller concerns to make use of written cards in the place of perforated or punched cards and to "hand-sort" the cards for compilations on a listing adding machine equipped for sheets that can be put in a permanent binder, thus accomplishing by hand, assisted by hand-

Digitized by Google

YARN MILLS, Division No.__ Summary of Production Costs, Month of_____191_

ELEMENTS	PRODUCTION		COST PER POUND		ELEMENTS	PRODUCTION		COST PER POUND	
	Pounds	Cost	This Period	Avg. 3 Periods		Pounds	Cost	This Period	Avg. 3 Periods
COMBING WOOL					SPINNING YARN				
Raw wool opened					Company Tops				
Sorting					Purchased Tops				
Opening and dusting					Gill boxes				
Scouring					2 Spindle gill				
Drying					4 " "				
Picking and mixing					8 " drawing frame				
Conditioning					Dandy Rover				
Carding					Spinning yarn				
Gilling					Redoubling "				
Combing					Reeling "				
Balling Tops									
Totals					*Totals*				
Noils					Hard waste				
Comb Waste					Soft "				
Card					Fly				
Picker					Sweepings				
Burr									
Material, Net					*Material, Net*				
Total Labor					*Total Labor*				
Total Overhead					*Total Overhead*				
White Produced					*White yarningrease*				
Britch "					*Light grey " "*				
Black "					*Dark " " "*				

Fig. 24.—Summary of Yarn Production

Digitized by Google

operated machinery, that which, beyond the original punching of the cards by hand, is done in the large concerns entirely by machinery. With the General Exhibit in use such mechanical aids are safeguarded and, when properly installed, become efficient servants.

On line 4 appears the total of goods returned by customers; this item is deducted from sales by a red-ink debit (in a manner previously discussed), in order that the net revenue may appear. As a matter of statistics these returns are kept somewhere chronologically, and usually where graphic charts are employed, a "graph" is kept for such return sales, showing the percentage of returns to total volume sold. In the case of the manufacturing cost of goods returned by customers, in this illustration, a hypothetical deduction has been made from the amount involved in the total cost of goods sold, as shown on line 3.

Purchases—Material

The Purchase Analysis (Figure 19) is more fully discussed in Chapter X, but mention is made of it in the present connection to say that the entry on line 5 presupposes the use of a Purchase Analysis Sheet as a summary sheet for all in dividual sheets in the month and the transferring of the grand total therefrom to the closing folio of the Exhibit. This hypothetical summary would not, of course, include sheet 14 entered on Exhibit, folio 2, on line 9, as an example of the individual entry of Purchase Analysis Sheets. The author expresses no choice of plans in the absence of specific information as to exact conditions of use; a choice is largely a matter of personal preference based on existing conditions.

Digitized by Google

FABRIC DEP'TS, Division No.___Summary of Production Costs, Month of_____191_

ELEMENTS	PRODUCTION Yards	PRODUCTION Cost	COST PER YARD This Period	COST PER YARD Avg. 3 Periods	ELEMENTS	PRODUCTION Yards	PRODUCTION Cost	COST PER YARD This Period	COST PER YARD Avg. 3 Periods
WEAVING					FINISHING				
MATERIAL Oneida 5/8					Operations, all product				
" " 3/4					" Sewed Rugs				
" Amsterdam 5/8					Baling Carpet				
" " 3/4					Diffused Labor				
" Imperial 5/8					Expense Overhead				
" Shuttleworth 5/8					Power Cost				
" " 3/4					*Oneida Shipped*				
" French Wilton 3/4					*Sehna "*				
" Kilmarnock 3/4					*Imperial "*				
" " 5/8					*Kilmarnock "*				
" Sehna 4/4					WAREHOUSING				
WEAVING Oneida Rugs					Oneida handled				
" Amsterdam "					Amsterdam				
" Shuttleworth "					Shuttleworth				
" Sehna "					Sehna				
" French Wilton "					French Wilton				
" Oneida Carpet					Burlap, Twine, etc.				
" Sehna "					Storing & Shipping Labor				
" Imperial "					Trucking				
" Kilmarnock "					Expense Overhead				
Total Loom Preparation					*Cost per Yard*				
Total Weaving Labor					*Avg. Yds. per Rug*				
Expense Overhead					*Cost per Rug*				

FIG. 25.—Summary of Textile Production

Digitized by Google

Returned purchases, as shown on line 6, involve practically the same conditions as that of returned sales, but conversely.

A material summary sheet appears on Exhibit, folio 2 (Figure 12), and represents page 16. A second summary sheet, page 23, appears on line 7 of Exhibit, folio 3. These sheets are usually entered in the Exhibit as often as they are compiled; hence sheets 17 to 22 inclusive are presumed to have been entered.

In cases where automatic sorting devices are employed, it is quite usual to have material issuances punched on individual cards (Figure 37), in which case each day's cards can be sorted and tabulated and the results entered on the Exhibit as a daily routine. This use is more fully discussed under Chapters XI, XV, and XVI.

Production Register

On line 8 appears the entry of the Production Register, sheet 93 (Figure 20), as an example of the entry of an individual sheet. On line 9 appears what purports to be a summary of sheets 94 to 98 inclusive. So far as the use of the summary idea is concerned, the same condition obtains in this case as is discussed under the handling of purchases in a preceding paragraph.

There are several different types of Production Registers in existence, and also there are entirely different plans for recording production; hence the references shown are not by any means the only way that figures can be supplied for the closing of the Exhibit, yet what appears on lines 8 and 9 can be considered as fairly typical of appearance, irrespective of the exact avenues of original entry routine.

Digitized by Google

Suspense and Reserve Items

On lines 10, 11, 12, and 13 appear what purports to be monthly apportionments taken from items held in "suspense," as shown under Group K in the chart of accounts, Figure 9. On lines 14 to 23 inclusive, appear the monthly reservations to be charged to Expense and set up as credit for purposes outlined under Group N of the chart of accounts.

While these various items have been individually displayed on folio 3 of the General Exhibit for purposes of discussion, it is not necessary to display them each recurring month. Instead a simple entry, embodying both the "suspense" and "reserve" items or, perhaps better yet, a line for each of the "suspense" items and the "reserve" items, can be given on subsequent closing folios. Such an entry or entries can read in effect, "Reserve items as displayed on Exhibit, folio 3" and show one total therefor; in each case this total will agree with the total of the summaries of "suspense" and "reserve" items shown on the Expense Analysis, Figure 83. Or again the entry can be made on the Exhibit with a reference to the various and several separate summaries shown on Figure 83, as for instance, "reserves for maintenance," "reserves for depreciation," "commercial reserves," and "suspense items."

Expense

Line 24 shows a blanket entry embodying commissions due to salesmen. In certain cases commissions are summarized from punched cards after the manner discussed under sales, in a preceding section of the present chapter. In other cases there are no commissions, as all

Digitized by Google

sales are handled by strictly salaried men. Hence in the item of commissions it will be understood that an Exhibit entry can be made daily, weekly, or monthly and from whatever source seems most convenient or advisable in the individual case where the Exhibit is to be installed.

The Expense Distribution Sheet (Figure 84) is shown on line 25. This involves merely a copying of column totals into the corresponding columns of the Exhibit. It may be said at this point with all possible emphasis that when segregations as shown on Figure 84 are had for any particular business, the longest leg of the journey in the search for actual costs will have been covered; whether a concern goes into the minutia of detail cost finding or not, it has some sound facts at its disposal when it has its expense carefully segregated to departments and brought into a General Exhibit as here shown.

The entry of the Expense Distribution Sheet serves to *clear* the "Accruing Manufacturing Expense" column of all its debits. This is done by a red-ink entry, as previously explained, and is indicated in the example by a *ringed* black amount in the absence of red ink.

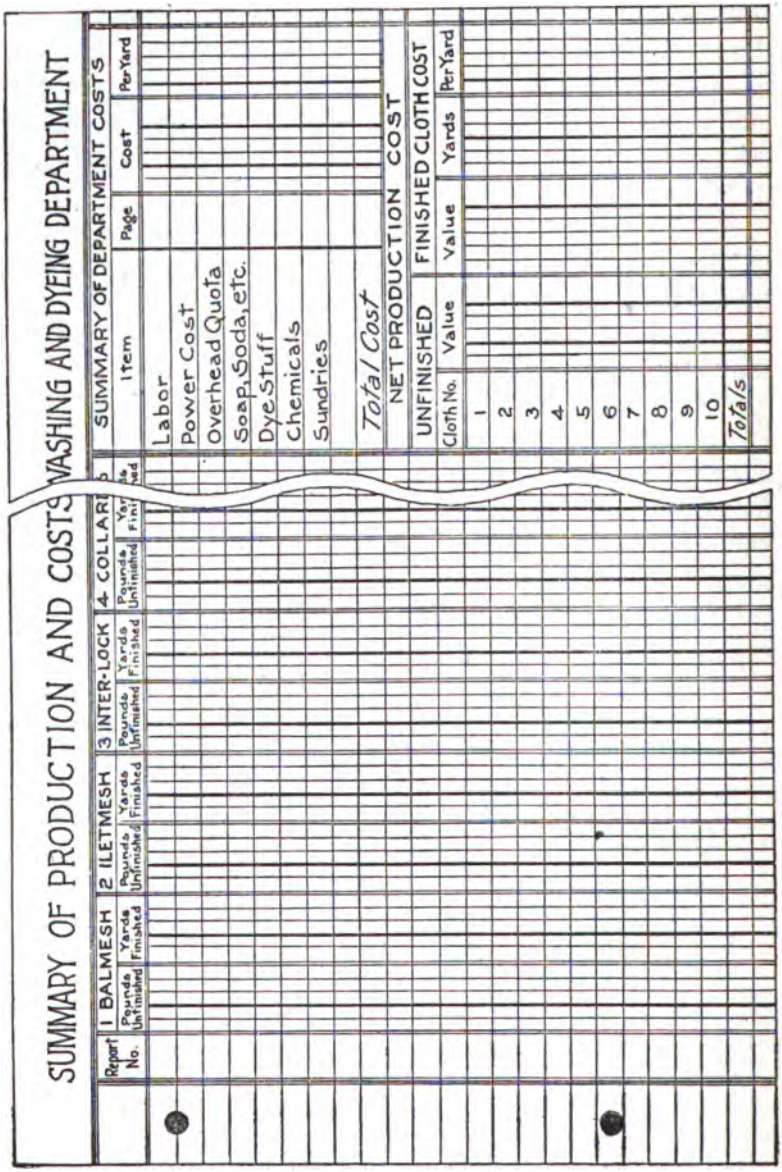
In like manner the final transfer entries on lines 26, 27, and 28 clear the columns of the "operations" group.

Summary of Entries

(All hypothetical unless otherwise stated.)

Lines 2-3		
Sales Summary, sheet 130		
City Customers	$ 34,107.02	
Country Customers	56,879.20	
Revenues		$ 90,986.22
Cost of Goods Sold	52,647.19	
Stocks		52,647.19

Digitized by Google



SUMMARY OF PRODUCTION AND COSTS — WASHING AND DYEING DEPARTMENT

Report No.	1 BALMESH		2 ILETMESH		3 INTER-LOCK		4 COLLAR		5
	Pounds Unfinished	Yards Finished	Pounds Unfinished	Yards Finished	Pounds Unfinished	Yards Finished	Pounds Unfinished	Yards Finished	Pounds Unfinished

SUMMARY OF DEPARTMENT COSTS

Item	Page	Cost	Per Yard
Labor			
Power Cost			
Overhead Quota			
Soap, Soda, etc.			
Dye Stuff			
Chemicals			
Sundries			
Total Cost			

NET PRODUCTION COST

UNFINISHED		FINISHED CLOTH COST		
Cloth No.	Value	Value	Yards	Per Yard
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Totals				

Fig. 26.—Summary of Dye House Production

Digitized by Google

Line 4		
Returned Goods Summary, page 131		
Revenues	3,956.33	
City Customers		1,827.19
Country Customers		2,129.14
Line 5		
Purchase Summary, page 18		
Foundry Material	19,242.76	
Woodworking Material	6,091.04	
Factory Material	47,642.28	
Supplies	347.19	
Manufacturing Expense	6,247.19	
Equipment	3,147.75	
Suspense	619.84	
Assets	4,267.04	
Reserves	498.12	
Commercial Costs	1,906.80	
Accounts Payable		90,010.01
Line 6		
Returned Purchases, page 19		
Accounts Payable	1,579.71	
Raw Stores		1,329.87
Manufacturing Expense		249.84
Line 7		
Material Summary, page 23		
Manufacturing Expense	127.19	
Material in Process	18,133.29	
Foundry Material (71)		3,214.28
Factory Material (75)		5,618.07
Finished Parts (83)		9,428.13
Line 8 (Figure 20)		
Production Register, page 93		
Finished Parts (82)	25.63	
Material in Process		8.12
Labor in Process		8.25
Expense in Process		9.26
Line 9		
Production Register Summary, sheet 98		
Finished Parts (82)	18,458.34	
Finished Product (84)	24,319.85	
Experimental Work (140)	320.40	
Equipment	1,684.13	

Digitized by Google

Maintenance	927.15	
Parts in Process		13,821.09
Material in Process		3,111.32
Labor in Process		12,349.65
Expense in Process		16,427.81
Line 10		
Insurance (134)	180.00	
Insurance in Suspense (451)		180.00
Line 11		
Printing and Stationery (184)	75.00	
Suspense (452)		75.00
Line 12		
Advertising (708)	500.00	
Suspense (455)		500.00
Line 13		
Professional Service (145)	100.00	
Suspense (457)		100.00
Line 14		
Taxes (133)	650.00	
Reserve (551)		650.00
Line 15		
Interest (135)	6,434.25	
Reserve (553)		6,434.25
Line 16		
Experimental (140)	500.00	
Reserve (555)		500.00
Line 17		
Over, Short and Damage (142)	250.00	
Reserve (557)		250.00
Line 18		
Variation of Weights and Measures (143)	250.00	
Reserve (559)		250.00
Line 19		
Factory of Safety (144)	500.00	
Reserve (561)		500.00
Line 20		
Maintenance (150-152)	1,000.00	
Reserve (563)		1,000.00
Line 21		
Depreciation (160-162)	2,407.00	
Reserve (565)		2,407.00
Line 22		
Loss and Gain (600)	819.32	
Interest (552)	819.32	
Sinking Fund Reserve (567)		1,638.64

Digitized by Google

Line 23		
Bad Debts (706)	**759.75**	
Reserve (569)		**759.75**
Line 24		
Commissions (700)	**7,642.90**	
Personal Accounts of Salesmen		**7,642.90**
Totals	**$326,062.98**	**$326,062.98**

Closing Operations

With all the foregoing figures in the General Exhibit the columns when footed by adding machine, or otherwise, will show as per the first two columns of the following list. Where a daily report form (Figure 14) is employed, the totals can be taken off on a slip sheet, and subsequently the net balance in each case extended. Figure 14 shows a single balance column for use with a double adding device, while the following list not being an adding machine reproduction, shows two columns, a debit and a credit.

When the net balances have been drawn and the equilibrium proved, the next step is to ink the balances in their proper columns.

This is effectively done by means of green or purple or any distinctive colored ink other than red, which indicates a meaning previously discussed. There is no significance to the green colored ink feature any further than as a ready guide to the eye, yet as the form is a large one and such guides are needed to minimize errors, it is quite important for that one feature alone.

With the balances in and the totals brought down to the regular footing lines, or possibly to a footing line specially drawn somewhere up the partially filled page

Digitized by Google

or folio, the process is complete and the balances can be carried forward practically as discussed in Chapter VI.

	Totals		Balances	
	Dr.	Cr.	Dr.	Cr.
Current Cash.....	$ 51,397.41	$ 51,397.41		
Bank No. 1.....	125,880.30	122,249.66	$ 3,630.64	
Bank No. 2.....	44,824.30	27,018.78	17,805.52	
City Accts. Rec...	138,537.77	9,313.52	129,224.25	
Country Accts. Rec.	198,131.82	14,304.28	183,827.54	
Raw Stores.....	226,876.80	28,561.90	198,314.90	
Stocks	171,149.72	109,119.20	62,030.52	
Material in Process	168,836.96	41,248.47	127,588.49	
Labor in Process..	153,748.79	45,987.83	107,760.96	
Overhead in Process	80,955.34	40,570.85	40,384.49	
Equipment	297,417.93	200.00	297,217.93	
Suspense	7,454.83	882.60	6,572.23	
Assets	626,366.19	5,862.50	620,503.69	
Liabilities	148,400.44	1,723,093.38		1,574,692.94
Accounts Payable.	35,549.29	175,629.03		140,079.74
Accrued Labor....	47,705.94	58,960.44		11,254.50
Reserves	9,800.31	78,634.29		68,833.98
	$2,533,034.14	$2,533,034.14	$1,794,861.16	$1,794,861.16

Digitized by Google

CHAPTER IX

THE CASH ACCOUNT

Relation to General Exhibit

When the General Exhibit forms part of the accounting system, it is quite essential for the best results that the records of cash received be entirely divorced from the records of cash disbursed. Such a separation renders much more difficult, and therefore decreases the possibilities of, fraudulent manipulation of cash.

The "imprest fund" (Figure 9, Group A) is intrusted to a petty cashier whose duty it is to give change and to make all disbursements for petty expenses and in settlement of invoices deemed too insignificant to be passed through the purchase records singly. The amount of this fund should be sufficient to provide for the current calls for ready cash for at least one week and will, therefore, be determined by the conditions and the practices of the particular business.

Whatever be the amount of the "imprest fund," there should be no further charges or credits to the account on the Ledger, unless it is decided to increase or diminish the amount. As current expenditures are made, they are evidenced by proper vouchers, and these vouchers are periodically taken up by means of a regularly issued voucher or check covering their amount, the items being then segregated and charged to the accounts to which they severally belong.

Digitized by Google

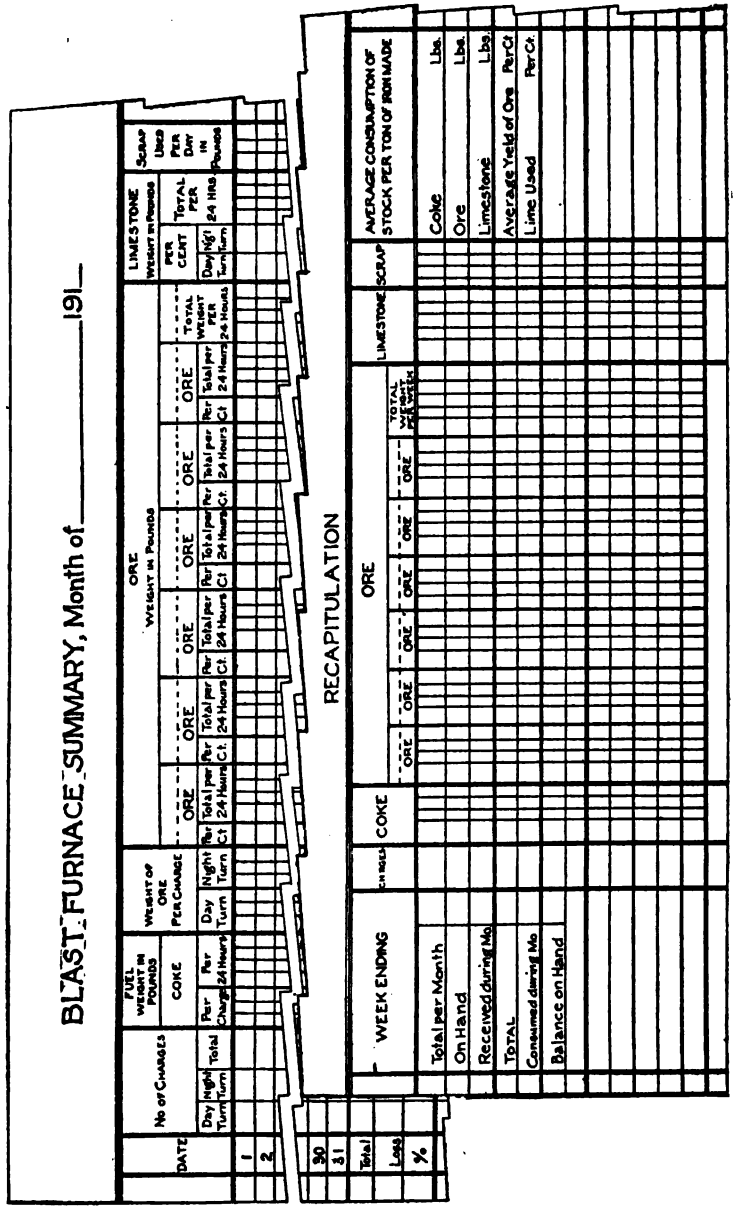


FIG. 27.—Summary of Blast Furnace Production (Left-Hand Side of Sheet)

Digitized by Google

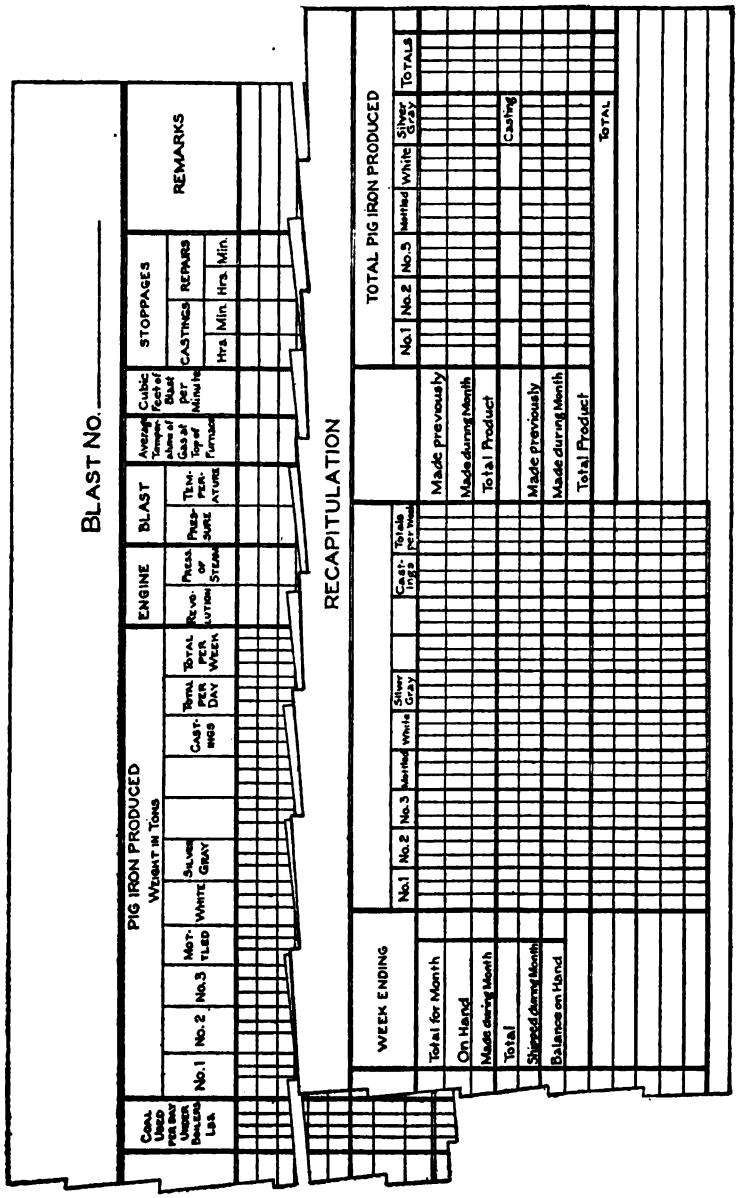


FIG. 28.—Summary of Blast Furnace Production (Right-Hand Side of Sheet)

Digitized by Google

Under this plan the "imprest fund" is kept intact, and if audited will always disclose either the money or its formal representations in cash vouchers, bank checks, pay tickets, or perhaps, entries of proper expenditures on the Imprest Cash Disbursement Book.

When accommodation checks are cashed from the fund, such checks should properly be drawn or endorsed either to cash or to the name of the cashier, and not in the name of the concern. There are many instances where a number of different "imprest funds" may be maintained, as for instance different petty cashiers around a large plant or at branches or, as more frequently happens, money given to road men for certain uses, as outlined on page 72 of Chapter VI. The *modus operandi* is the same for many accounts as for one. Where there are a number of funds which remain practically stationary, then one account with "imprest funds" will answer, provided the ledger account is kept specifically clear. In the case of traveling foremen it seems better to maintain a separate account with each individual, charging him when such a fund is intrusted to him and crediting him upon its return. Upon his departure to the next job a new charge is made for whatever fund he is intrusted with; in this way the recurring "imprest fund" transactions of each man are succinctly set forth in one certain ledger account.

Cash receipts in the form of currency should not be intermingled with the cash of any "imprest fund," but should be deposited in the bank with other receipts for the day. There is, in the main, no objection to an even exchange in money values between current receipts and the "imprest fund," as for instance where smaller bills are desired in the "imprest fund" and any

Digitized by Google

exchange is made with the cash of current receipts, or even where a check made to the order of the cashier, and originally cashed from the "imprest fund," is turned into current receipts in exchange for an equal amount of cash. There are, however, notable instances where corporations accepting extended payments in the purchase of their product, require for certain legal reasons that the various selling and collecting agencies remit the home office the identical pieces of money, checks, stamps, etc., that were tendered in payment. Ordinarily when small remittances from debtors are received in postage stamps, the stamps may be purchased with money from the "imprest fund" and the transaction treated as a payment in cash.

When the cash receipts of each day or other period of time are covered into the bank intact, the footings of the Cash Receipts Sheet can be kept in exact articulation with the bank's record of the transactions, thus minimizing any possible danger of manipulated figures. The entry on the General Exhibit when a deposit is made is to credit Cash and debit the Bank, the debit entry coming under the proper bank if there is more than one depository. (See Figure 12, lines 2, 5, 15, 18, 27, and 30.)

Theoretically the Cash Receipts Sheets (Figure 16) and the Check Register Sheets (Figure 17) should be footed and the footings transferred each day to the General Exhibit. In practice, however, the daily transfer is not usual, except where the sheets involved are quite numerous.

Also, as a matter of practice, when financial reports are made, the totals of those records which, theoretically,

Digitized by Google

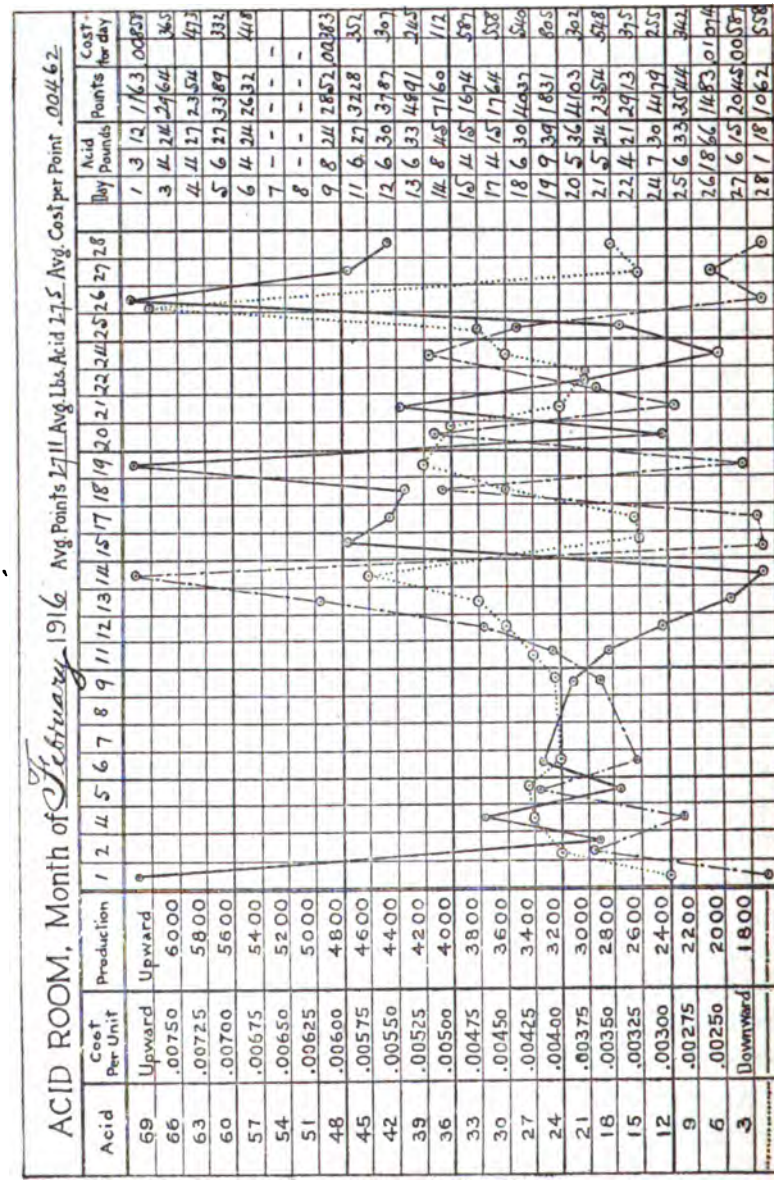


Fig. 29.—Peak Sheet under Point System

Digitized by Google

should be on the General Exhibit daily, but which in practice are not so entered until the end of the week or month, can be assumed to be entered, and, to make this effective, the pencil footings to date on such auxiliary record (Figure 16, below line 14, and Figure 17, below line 19) can be added to the figures that are actually on the General Exhibit. In cases involving a large number of items this practice is not feasible, and the General Exhibit must then each business day absorb the totals of all auxiliary records that can be run on a daily basis.

There are cases where bank accounts may show as overdrawn while yet the bank records show a substantial balance to the depositor's credit. This is brought about by long outstanding checks, as for instance in a certain live-stock industry in the Middle West, where hogs and cattle are purchased in small lots from numerous shippers, many of whom for safe-keeping hide the checks received in payment until the money is needed. There is, perhaps, no just reason why a second check should be issued against money already checked out, yet it is done on the hypothesis that the checks are equivalent to demand notes which the bank will honor upon presentation. There is, perhaps, as much logic in the depositor's making legitimate use of the balance without cost instead of paying 6 per cent on loans as there is in the bank's enjoying the benefits of it without paying more than 2 per cent or 3 per cent on the average daily balance. This state of affairs, however, is tempting to cashiers who are susceptible to improper impulses, as it presents opportunity to "borrow money from the company" without authority and without much chance of detection by other means than a detailed audit embodying, of course, a reconciliation of the bank balance.

Digitized by Google

Cash Receipts Sheet

Figure 16 represents a form very commonly used in connection with the General Exhibit and in some cases used in connection with an old-style Cash Book employed to receive totals from two or more subsidiary records. This form is represented as a sheet punched for a modern loose-leaf device; at the top is printed the name of the form and space for writing the name of the current month in which it is used. The progressive number indicates the sheet or page number, and as it is usual to have these sheets printed on the two sides, the reverse side of sheet 3 would show as progressive sheet 4. The reference shows Exhibit folio, and line shows where the totals of the page are transferred to and absorbed by the Exhibit, as will be seen on Figure 12.

This form is much more crowded in appearance than would be a typical sheet in actual practice, owing to the number of different types of entries shown. Ordinarily the great bulk of entries is merely receipts of cash from customers.

Figure 16, like all other of the subsidiary records, is in equilibrium, and when debit and credit columns are summarized, they appear as follows, viz:

Dr.	Cr.
$38,684.21	$ 1,483.94
226.09	10,612.52
1,219.81	28,033.65
$40,130.11	$40,130.11

The eight narrow columns at the left indicate the form of the remittance received and are explained as follows: "Local Ck.," indicating a local check. This usually

Digitized by Google

is the customer's, or payer's, own form of check on his local bank.

"Cashr. Ck.," indicating cashier's check and meaning a bank cashier's draft on his own bank or one of its depositories, presumably New York exchange.

"Draft," meaning that a draft drawn on the customer has been deposited for credit at the bank and collection by them. (It is only by an understanding and arrangement at the bank that this can be done.)

"P.O.M.O.," indicating post-office money order.

"Exp. M.O.," indicating express money order.

"Warrant," meaning a village, city, county, state, or other corporate form of order for money having a negotiable value.

"Postage," meaning that the remitter enclosed stamps in payment. These are usually purchased through the "imprest fund" and the amount included with the other items and deposited in due form.

"Currency," meaning that the amount received was in actual cash and not in any documentary form.

The use of check marks in these columns entails no hardship on the cashier, and it does make a full and complete record of the transaction.

In some businesses it is a considerable help in tracing items back, and in other instances its value lies in keeping a close check on the bank account. In certain installment houses where large numbers of items of a given amount are received, the deposits are made up by packages of money orders only of a given amount, etc.; hence an indication of the form of remittance is quite essential.

Under the heading, "Amounts Received," appear

Digitized by Google

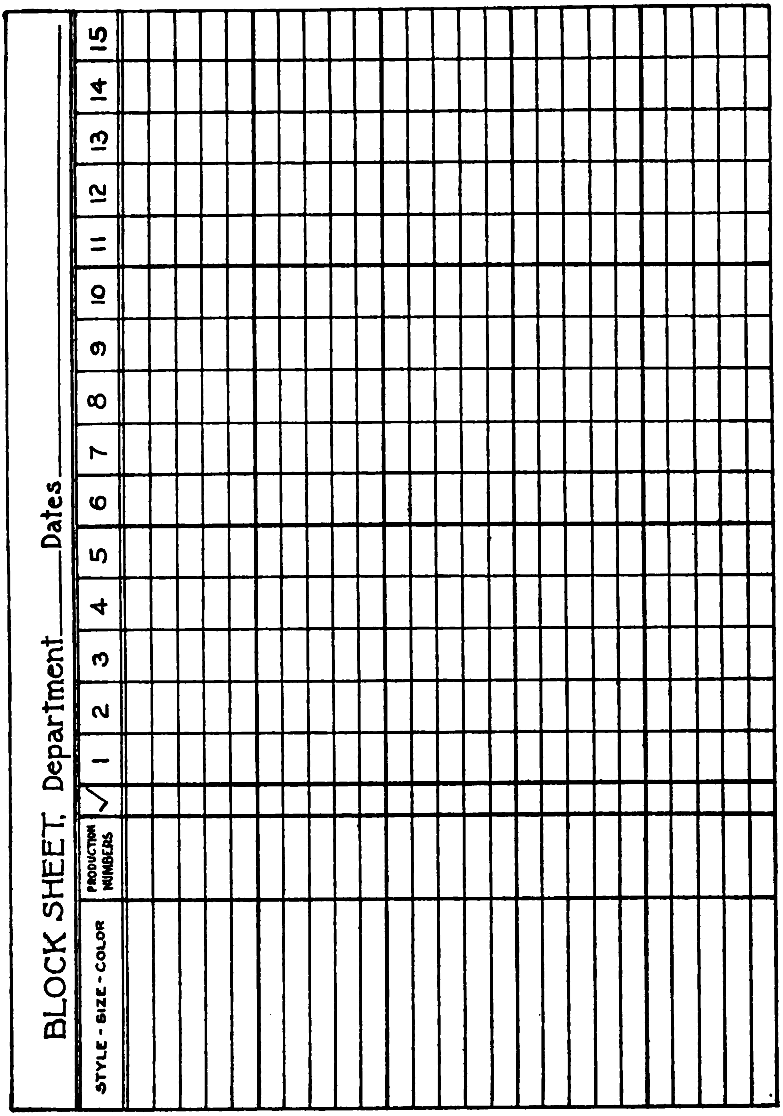


FIG. 30.—Departmental Block Sheet

three columns, headed respectively, "Cash—Dr.," "Bank Number," and "Memoranda of Deposits." In the "Cash" column is shown the exact amount received after any and all deductions have been taken off by the remitter.

In the "Deposits" column is shown the total of all items received since the last deposit was made; opposite this total amount is shown the number of the bank in which the money was deposited. As for instance in Figure 12, line 15, under Bank No. 2, see the deposit shown on the ninth line of Figure 16. In like manner see line 18, under "Bank No. 1," for the deposit shown on the thirteenth line of the Cash Receipts Sheet. Lines 22 and 27 respectively, show the deposits on the twenty-first and the thirtieth lines of the Cash Receipts, being respectively the No. 1 and the No. 2 bank deposits.

Where the banks are scattered as to location, as for instance a New York bank being used, it quite frequently happens that such checks as are free of collection charges in one of the banks are sent to that bank instead of to the other bank, where collection charges will be levied. In this case it becomes necessary to write the designation of the bank opposite each check included in a given deposit total. As this is necessary for only one of the accounts, the usual plan is to pick the bank having the fewest items in the deposit. The items of the other bank deposit are designated then by the absence of any indicating number.

Types of Cash Receipts Entries

The column headed "Received from" is primarily to show names, although it is in fact a general descriptive

Digitized by Google

column and can be used for descriptive matter in whatever manner desired. The sixth line in Figure 16 is used for a concise statement in connection with the entry on the fifth line. As many lines as desired may be used for a single entry, and in the case of extraordinary entries enough space should be used to make the record clear and explicit.

The column headed "Descriptive" is for showing a tersely expressed identification of the cash item. Where dates alone are shown, it is intended to indicate dates of invoices which are being covered by the payment. Examples of this are shown on the third line (two items), on the eighth line (six items), on the ninth, tenth, and eleventh lines (one item each), and on several lines thereafter. Where, as on the first, fourth, and other lines, it shows "stmt.2/1," it indicates that the entire statement of February 1 was paid for.

The item on the fifth line involves the payment for a used truck sold. As this truck is hypothetically entered in the account, Motor Trucks (414-415), at its original cost price, it must be credited out of that account at the same figure it was charged in. To accomplish this the difference is absorbed into Reserve for Depreciation of Equipment (564). If Motor Trucks Account were to be credited with only the amount received for the truck sold ($1,250.00), there would remain in the asset account a fictitious value of $550.00 against nothing whatever, hence the need of the entry as shown.

The seventh line shows payment of a note for $562.50, together with interest thereon, $11.25. Instead of taking two lines for this, an encroaching entry is made on the

Digitized by Google

line following, the two items being tied by a bracket, as explained in Chapter VI.

On the ninth line is payment of an invoice less certain freight charges that the customer has deducted, the freight item being duly charged to account 712.

On the thirteenth line appears an item purporting to be a local check received from an attorney in full settlement of the hypothetical "Boswell Case." It appears the settlement was for $15,800.00, but from this the attorney deducted his fee of $500.00. The full amount is credited to a "various revenues" account called "Other Sources" (908-9), and the attorney's fee is duly charged to Law Expense (188) in the administration cost group (F).

On the seventeenth line is shown the payment of a note, a transaction quite similar to that on the seventh line.

On the eighteenth line is shown an entry which at times is quite puzzling to know how to allocate properly. It represents an advance payment made against certain work which is to be done, or certain goods furnished, where the work has not yet been started. In this case it is credited to Revenues under Other Sources. It cannot consistently be credited to a sales account, as it is not yet in shape to invoice. It cannot well be credited to Accounts Receivable, as it would either stand alone as a credit or act in diminution of debits against which it does not apply. It cannot be classed as an account payable, as it would improperly swell the total liabilities.

An item of this kind does not disturb a well-financed business, but where the amount is much larger and the

Digitized by Google

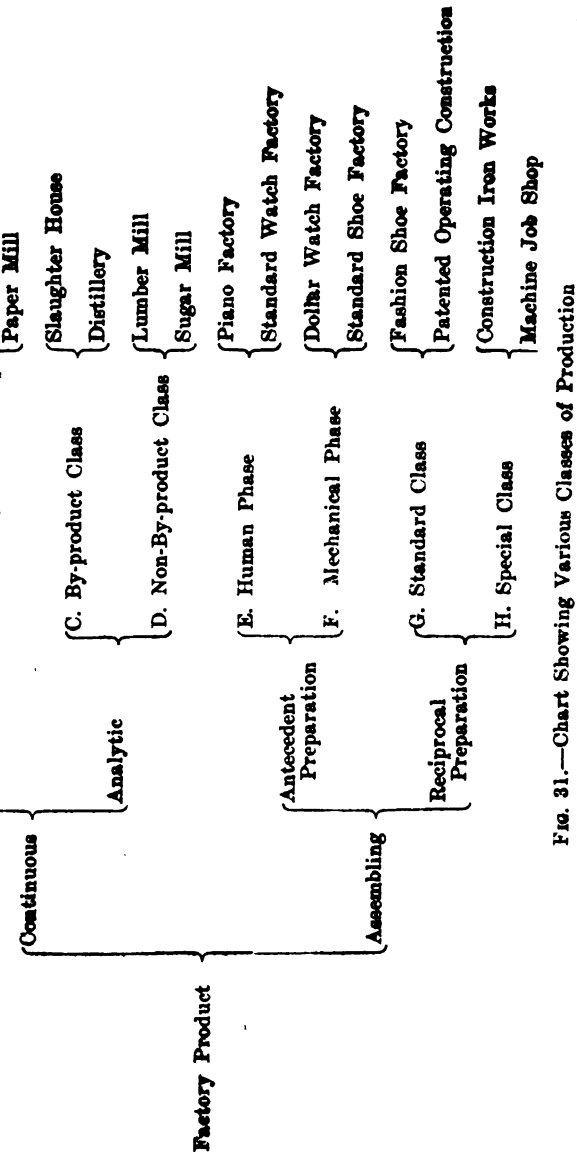


Fig. 31.—Chart Showing Various Classes of Production

Digitized by Google

concern is borrowing to its limit, it becomes an object of possible chicanery. The author has known such an item to be credited to "Goods in Process" on the hypothesis that the advance is made not only as an evidence of good faith, but as a help in carrying the extraordinary burden which the contract lays on the factory. As a proper solution under certain conditions, it may be the part of wisdom to open a special reserve account for such an item.

When a business is normally in receipt of a large volume of cash with order business (C. W. O.), a special "C.W.O." column is usually provided and the accounts are kept in a special "prepaid accounts receivable" group, the total of which, obviously, is on the credit side and is self-explanatory when stated in a balance sheet.

What purports to be the receipt of a dividend check from certain stockholdings, appears on the ninteenth line and is shown as credited to the "Other Sources" column. The same applies to the line following, where a railroad claim is paid.

An item where a cash payment was made for service of a motor truck without a bill being rendered appears on the twenty-second line.

On the twenty-third line appears an entry involving a contra account where a buyer is also a seller. These items are usually annoying and involve an upsetting of routine, save only where they occur so frequently that special preparation is made for it in the various forms. In that case there would be a special column for "Accounts Payable" in the Cash Receipts Sheet.

The refund of an overcharge in an insurance premium is shown on the twenty-sixth line. Credit is passed to

Digitized by Google

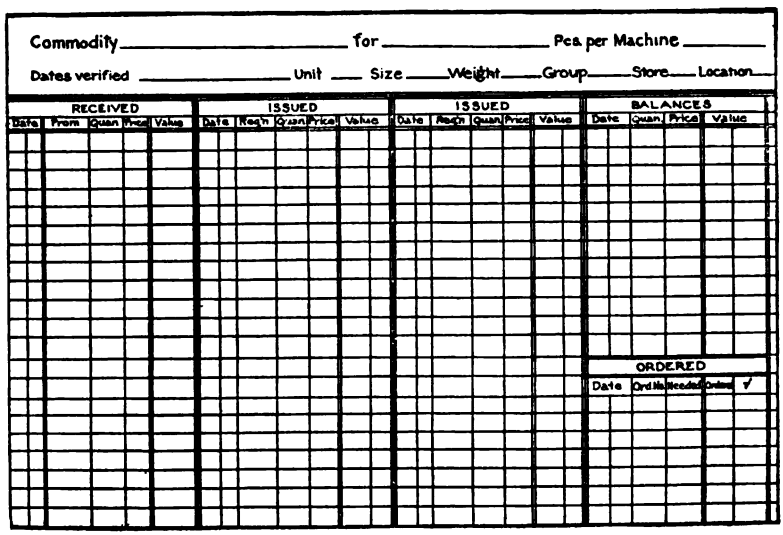
the "suspense account" group (K) "Insurance Paid in Advance" (451).

A porter was overpaid, and the amount was turned back into cash, as shown on the twenty-seventh line. This appears as a credit to "Porters and Messengers" (223) under the "manufacturing expense" group (E) and will be further discussed from other angles in succeeding pages.

The last entry on the sheet represents a small balance paid in stamps and is handled the same as any other simple entry, the stamps being purchased for cash from the "imprest fund," as previously explained.

Analytical Columns

The "Other Accounts" columns of Figures 16 and 17 make it possible for a journal entry to be made in either of the forms. While a number of examples have


Commodity _____ for _____ Pcs. per Machine _____

Dates verified _____ Unit ____ Size ____ Weight ____ Group ____ Store ____ Location ____

RECEIVED					ISSUED					ISSUED					BALANCES			
Date	From	Quan	Price	Value	Date	Reqn	Quan	Price	Value	Date	Reqn	Quan	Price	Value	Date	Quan	Price	Value

ORDERED					
Date	Ord No	Needed	Ordered	✓	

Fig. 32.—Stock Ledger Card

Digitized by Google

been shown in order to acquaint the student with possible contingencies, yet, in actual practice, the entries in the debit column of the Cash Receipts Sheet and in the credit column of the Check Register Sheet are quite infrequent. It might be asked, why have them? The reason is that the presence of such columns presents a solution for any entry condition that might arise, whereas the absence of such columns, at times, may, and actually does, make awkward conditions possible.

In cases where any one or more classes of entry are frequent and the presence of one or more additional columns seems advisable, they can be so supplied when a new form is devised. Where more than one class of item is entered in the "Other Accounts" group, involving more than one column in the General Exhibit, in the transferring of totals, it becomes necessary to *analyze* the subsidiary record column to the end that all the items involved may find their way to the proper controlling account column in the Exhibit. This can be done on a scratch pad if there are a considerable number, only the totals shown in the column being analyzed after the manner portrayed in all four of the "Other Accounts" columns in Figures 16 and 17. The designations of these totals may be by written captions as shown in Figures 16 or merely by the letters indicating groups (in accordance with chart, Figure 9) as shown in Figure 17.

In practice these analyses are usually "up-ended" in the columns to prevent any possible confusion with the regular figures of the column and, moreover, they are written small and in a distinctive colored ink.

As has been said, a certain column in both the Cash Receipts and the Check Register forms are but

Digitized by Google

infrequently used; hence they usually present available space where colored ink analyses may be neatly and concisely shown. In order that the entire columnar analyzing process may be displayed in a manner susceptible of a quick checking-back process (in case of error or of future audit), the following form is suggested, taken from Figure 17, which is very much fuller than appears in actual practice. By writing small and possibly by making use of space in the symbol column this form can be employed, copied perhaps from a scratch-pad draught.

Dr.		Cr.		
Mfg. Exp.	$ 500.00	Mfg. Exp.	$ .30	
Accounts payable	125.00	Mfg. Exp.	3.75	$ 4.05
Reserves	550.00			
Commercial Costs	44.81	Suspense		27.60
		Assets	$ 1,800.00	
	$1,219.81	Assets	562.50	
		Assets	3,500.00	5,862.50
		Reserves	$ 11.25	
			105.00	116.25
		Revenue	$15,800.00	
			5,000.00	
			1,200.00	
			16.75	
			6.50	22,023.25
				$28,033.65

Another plan is to make the original analysis in or near the column analyzed, using space wherever it is available. The following analysis of the "Check Register" debit column, presenting very many more items that would obtain under normal actual circumstances, is shown here for example.

Digitized by Google

E-F	*B60*	*C*	*H*	*M510*
$ 500.00	$50.00	$16.75	$80.00	$40,000.00
615.00		36.22		15,000.00
365.00				
900.00	*M514*	$52.97	*K*	$55,000.00
433.00	$38,063.10		$100.00	
50.00		*I*	215.00	
100.00		$6,500.00	500.00	
6.00			100.00	
250.00				
	N	*X*	$915.00	
$3,219.00	$72.50	$627.19		

CHECK REGISTER SHEET

Figure 17 is, to all intents and purposes, exactly like Figure 16 in its operation, save that each is the exact antithesis of the other; where one records the receipt of money and shows its transfer to the bank, the other deals only with itemized withdrawals from the bank.

That the debit items equal the credit items is proved by the following test:

Dr.	Cr.
$ 13,244.59	$112,619.83
104,579.76	4,600.16
	167.17
$117,824.35	437.19
	$117,824.35

The first group of columns has to do with the checks constituting the principal credit, while the columns on the opposite side deal with the disposition of the debit. In this form the disposition column most largely used is the Accounts Payable, the "Other Accounts" debit column being used but infrequently, as previously explained. Whether the "discount" credit column is

Digitized by Google

frequently used or not is entirely a matter of the financial condition of the company employing the method —whether they are able to discount their bills.

The uses of the "Payee" and "For" columns are practically the same, as previously explained in connection with the Cash Receipts Sheet.

Under the "Bank Checks" group appear a memoranda column, a narrow check-mark column, a (bank) check-number column, and a money column for each separate bank. The memoranda column is for two purposes, namely: (1) to make pencil or ink annotations of the available bank balances as shown on the first line where, after all previous checks have been considered, Bank No. 1 has $39,280.98 and Bank No. 2 has $9,844.19, against which checks can be drawn, and (2) to show, usually in a distinctive colored ink, any checks that are outstanding when the bank's monthly balance is reconciled. In the latter use, in the absence of colored ink, a circle with a horizontal line across is used to represent Bank No. 1, and a circle with a vertical line across is used to represent Bank No. 2. Where canceled vouchers (checks) are returned by the bank, a check mark is placed in the check column; in coming to a check number that has not yet been returned by the bank, the amount thereof is carried to the "memo" column (as per seventh, sixteenth, and twenty-eighth lines for Bank No. 1, and fourth, tenth, and thirty-first lines in the case of Bank No. 2). Where different colored inks are used each successive month, it is possible to discern quickly in which "balance" a certain check was returned from the bank, also to foot easily each bank's checks separately. These footings are usually carried forward from one sheet or page to the next and form a cumulative total which, at the last page involved

Digitized by Google

in the balancing process, gives the total outstanding checks.

In Figure 17 but one check-number column is used for both banks. It is not at all necessary to write each check number in full, and where a number of successive checks are issued on one bank, the writing of the full number is sufficient every tenth number. Where a check number is injected for the other bank, that, of course, breaks the continuity and necessitates the full number again immediately after the break.

Some users prefer separate sheets entirely for each separate bank and, under some conditions, particularly where large numbers of checks are issued, that is preferable.

The Check Register Sheets and the Cash Receipts Sheets are quite usually of the same dimensions and kept in the same binder marked "Cash."

Types of Check Register Entries

The first entry shows a check issued to cover the office pay roll, and in similar manner under date of February 8 is shown a check to cover the factory pay roll. Under certain conditions it is a help to treat the pay roll as an invoice for labor performed and to enter it in the Purchase Analysis. This plan, however, is quite likely to have confusing conditions arise and is not advocated for general use. The present entry charges the amount directly to the controlling account, "Accrued Labor," to which credit has been previously passed, as discussed on page 86 of Chapter VII under subsidiary records and on page 288 (Figure 80).

The fifth line shows the reimbursement to the cashier for moneys he has expended from the "imprest fund;"

Digitized by Google

STOCK DEP'T
REQUISITION

DATE _____ 19___

TO PURCHASING DEP'T —

PLEASE ORDER THE FOLLOWING NAMED GOODS

TO BE DELIVERED _____ FOR MACHINE _____

_____ STOCK CLERK

QUANTITY	SIZE	✓	DESCRIPTIVE

FIG. 33.—Purchase Requisition

the voucher covering these items having been duly entered on line 4 of the Purchase Analysis (Figure 19).

Typical payments of "Purchase Analysis" items appear on various lines down the sheet, namely, second, sixth, eleventh, sixteenth, and from twenty-fifth to thirtieth inclusive.

On the third line is what purports to be an advance of cash, made to a country customer in town, the item being charged to the customer's account. The fourth

Digitized by Google

line is a "pick-up" item of wire purchased without using the regular purchasing routine.

Similar to this is the payment of dues to an organization, though ordinarily such a charge is represented by a bill put through the Purchase Analysis in the regular way. Others items analogous to this condition are found on lines following, namely, ninth, tenth, thirteenth, fourteenth, eighteenth, nineteenth, twenty-fourth, thirty-first, and thirty-second. It usually is the exception rather than the rule where "Check Register" items are directly charged elsewhere than to "Accounts Payable," and in this example the "other accounts" group is filled up to an extent not often seen in actual practice. It presents a better aspect, from all angles, if the broad rule is made to enter all items payable that can be covered in a bill or invoice in the Purchase Analysis to the credit of Accounts Payable, and hence such items as cover the payment thereof will appear as a charge in the "Accounts Payable" debit column in the Check Register, leaving the "Other Accounts" column for extraordinary entries and entries other than those involving a commercial invoice.

The eighth line presents a properly typical use of the "other accounts" group—an advance of money as an expense fund; so also does the twenty-first line and again the twenty-third line. In each of these cases the "other accounts" group would have been used even if entered in the Purchase Analysis.

On the twelfth line is an entry involving a "trade-in." This entry will involve perhaps an Exhibit entry to finish the transaction so far as the Office Fixtures and Machinery Account (401) is concerned. Assuming that $375.00 was the original price of the machine traded in,

Digitized by Google

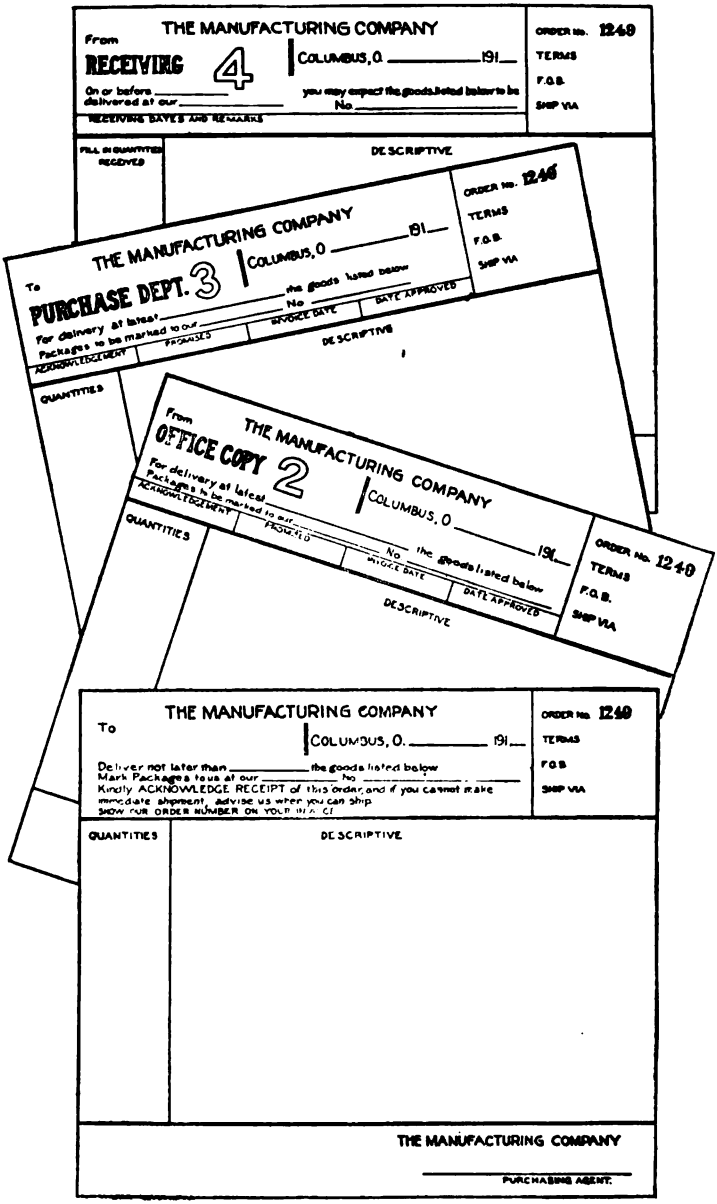


FIG. 34.—Purchase Order

Digitized by Google

the credit of $200.00 leaves $175.00 still in account (400). This balance must be charged to Reserve for Depreciation (564). It would have been done in the present "Other Accounts" column after the manner shown on Figure 16, sixth line.

On the fifteenth and twentieth lines appear checks for "lifting" notes due at the bank. This is always the most satisfactory way of handling notes payable rather than "renewing" them. When notes are paid, the transaction is closed; if a new loan is negotiated to enable the borrower to pay the former loan, that is a new transaction and comes on to the records in a clean-cut way, whereas in ordinary renewal proceedings it often happens that the bookkeeper knows nothing of the renewal, perhaps handled by a superior officer, until, being out of balance, somewhere in his cash records he has to seek the cause. In any case renewals require written explanations and references not at all necessary where notes are paid by check and new "discounts" credited on the depositor's account by the bank.

After the various examples shown a quite unusually large analysis is made necessary in the "other accounts" group, which shows as follows (based on Figure 9) viz:

	Dr.		Cr.
60	$ 50.00	H	$200.00
C	52.97	Z	237.19
E-F	3,219.00		
H	80.00		$437.19
I	6,500.00		
K	915.00		
M 510	55,000.00		
M 514	38,063.10		
N	72.50		
X	627.19		
	$104,579.76		

Digitized by Google

These figures are posted to Exhibit, folio 2 (Figure 12), on line 11. As the entry of each total is made, such entry is evidenced by a check mark.

In making check marks on records of this kind, care should be exercised that uniformity is observed. If check marks are neatly made directly under one another and all of the same shading and slant, they are not as pleasing to the eye; on the other hand, when they are sprawled, promiscuously down a column, they not only smack of inaccuracies but give the impression of sloppy bookkeeping.

Digitized by Google

CHAPTER X

PURCHASES

Antecedent Records

The present chapter deals with the controlling records surrounding purchases and does not essay to encroach upon details more properly belonging elsewhere. The need of certain purchases, the routine observed in acquirement, and the proper disposition thereof upon receipt are reserved for Chapter XV for "material" items and for Chapter XVII for "expense" items.

A "safety-first" feature in purchasing is to guard against overbuying both as to material needs and as to ability to meet promptly financial maturities. To this end a form of "blotter" is used, by cautious concerns, to record orders given to supply houses. This book is not usually a constituent part of the general accounting plan, but is in memorandum form only; it presents contingent liabilities and there, excepting in very few cases, its usefulness ends.

Figure 18 shows a typical form of this kind as applied to a furniture factory; other lines of production would depart from this form mainly in the classifications of commodities, other features remaining practically unchanged. Where such a record as this is obtained, it is a foregone conclusion that its entries are well scrutinized before any considerable volume of money value in the way of accounts payable is entailed.

Digitized by Google

The Voucher System

A system of recording expenditures which for a few years made great headway in modern business, but latterly waned for factory uses, is that known as the "voucher system." With railroad companies the use of vouchers and vouchered pay rolls in making disbursements has become universal and is outlined here as a typical use of the general plan. Vouchers are drawn up to represent all supply bills, all balances due to foreign roads, etc.; vouchered pay rolls are the basis for the payment of all salaries and wages.

One of the administrative departments of a railroad company is that of the purchasing agent. All purchases for their shops and various departments are made on order (Figure 34) from this department. The goods purchased are delivered at some designated point along the lines of the company, but all invoices for these goods are sent directly to the purchasing agent.

With one operation of the typewriter (very similar in physical handling to that of a purchase order, Figure 34) there is made out (1) a voucher, (2) a certified copy of the bill, (3) a duplicate, and (4) a triplicate.

The voucher and the certified copy are retained temporarily by the purchasing agent; the duplicate and the triplicate are sent to the general superintendent of the grand division for which the goods were purchased. He forwards the duplicate to the consignee of the goods, and the latter compares it with the actual goods received, O. K.'s it, and returns it to the general superintendent, who forwards it to the purchasing agent. The general superintendent retains the triplicate in his own files.

The purchasing agent then sends the certified copy

Digitized by Google

with the voucher to the auditor of disbursements, who checks additions, extensions, and by whom approved. If correct, he appends his own signature. It is then entered in a Voucher Register (very similar in effect to Figure 19) with classifications fitted to a railroad's records, such as maintenance of way, maintenance of equipment, transportation costs, etc.

The voucher is then sent to the comptroller to be approved for payment, whence it is returned to the auditor of disbursements, who forwards it to the office where the bill originated, to be delivered to the consignor of the goods. The comptroller lists such vouchers on an adding machine and credits the Vouchers Audited Account in the General Ledger for their total each day. The reverse side of the voucher constitutes a check or order drawn by the treasurer in favor of the consignor for the amount of the bill. The payee endorses this check and deposits it in his own bank, whence it comes eventually to the company's bank. When the check has been returned in the usual way to the office of the treasurer, it is turned over to the office of the auditor of disbursements. This office enters the date of receipt in the Voucher Register, and the voucher itself with the payee's endorsement constitutes the payee's receipt for the money.

This is the course of procedure for an ordinary purchase. In the case of materials and supplies, where a number of purchases are made from the same supply house in a month, the procedure is varied to a certain extent. Instead of vouchering and approving each bill separately, one voucher may be drawn to cover all the bills from the same house for one month.

At the end of the month the voucher account in the

Digitized by Google

General Ledger (kept by the comptroller) is verified by abstracting, on an adding machine, the amounts of all vouchers in the Voucher Register which are not indicated as "paid."

This plan it can readily be seen, while having merit for large and ponderous organizations, is not well fitted to factory propositions whose organizations are more "closely knit." Still there are many large factory

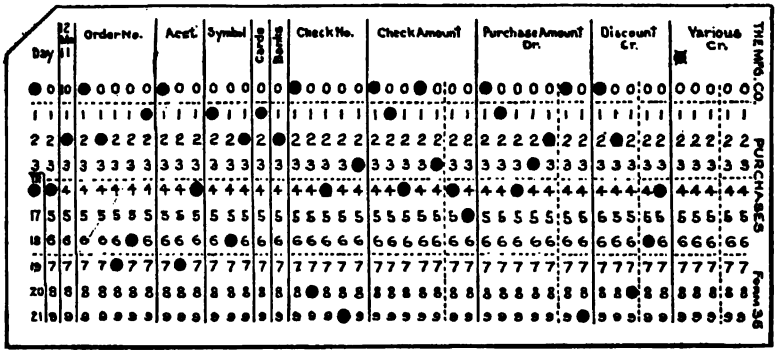


FIG. 35.—Punched Card for Purchases

organizations which employ it largely because of the numerous approvals required for each expenditure made. This does not mean that each and every invoice received is vouchered before it is investigated, as that is not so; each invoice quite usually is passed on individually before it comes to the hands of the voucher clerk at all. Its accuracy as to receipt of goods, prices, extensions, footings, etc., is usually investigated in a fitting manner; hence the voucher for the most part acts as a place of registration of approval signatures of ranking officials, a jacket for enclosing the invoices in a compact final file, an explicit receipt of the payee, and a collective means of arriving at charges against operating accounts.

Digitized by Google

Under the voucher system no Purchase Ledger is maintained wherein are entered to the seller's credit all invoices passed for payment and all checks given or charges levied against him. Instead there is maintained an index showing the name of each creditor and the voucher number, or numbers, issued in his favor. Where this index is lacking, there usually is confusion at times.

Under the voucher system no record is had of the current liabilities of the company until invoices are vouchered and entered, unless perchance a positive record is maintained after the manner discussed in relation to Figure 19, the record of goods ordered. Where concerns are slow pay, it often happens that their purchase invoices go sixty days or more before vouchering, in which case the voucher system is inadequate. In other cases the invoices are properly vouchered and credited to a Vouchers Audited Account but held for payment for some future time when they are, perhaps, transferred to a Vouchers Payable control account.

There are accountants who still cling tenaciously to the voucher system as a panacea for all accounting evils, just as there are still to be found those who have not yet come to the voucher system stage, still clinging to the fallacy that without a Creditors Ledger one would be all at sea as to the true status of any given creditor's account. The wonderful strides made in the improvement and development of "mechanical brains" now make possible many things that until a very few years ago were seemingly impossible. With the equipment of a voucher index and a listing adding machine as much, or even more, information can be compiled in a reasonably short space of time concerning commodity purchases from any certain creditor over any desired

Digitized by Google

space of time under a voucher system than would be possible to record under a Creditors Ledger plan embodying merely dates and invoice totals.

Properly indexed and when under "control," as in a General Exhibit or its equivalent, the Voucher Record is a useful book. It discloses the amount of vouchers payable which were received from all sources during

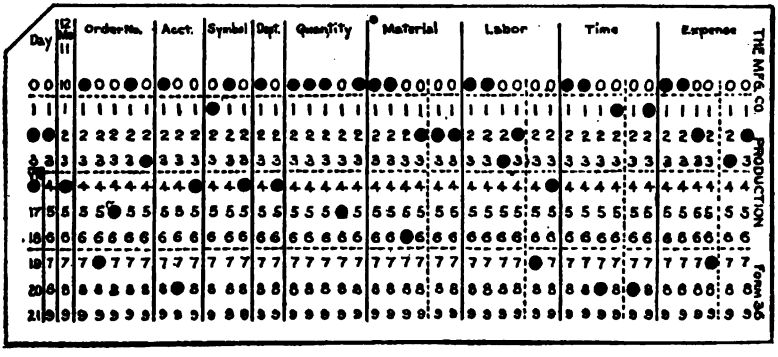


FIG. 36.—Punched Card for Finished Orders

the month and previously, and provides for the distribution of the amounts, whether to the classes of materials purchased, or to the individual accounts set up to analyze the expenses of the period. But there is a limit to its usefulness, and to claim more for it than it can do is to mislead the student of accounting.

THE PURCHASE ANALYSIS

Figure 19 shows a form which is perhaps an outgrowth of the Voucher Register idea, embodying most of the strong points and but few of the weak ones. It differs from the analytical Purchase Journal only in that it provides for the recording of data concerning

Digitized by Google

payment to the creditors for the invoices recorded. The only essential difference between the use contemplated for this form and that of, perhaps, practically the same form, spoken of as a "Voucher Register," is that in the present case each separate invoice is individually considered and treated as a unit of payment, whereas in a Voucher Register the voucher is the unit of payment.

The actual method of payment used in connection with the Purchase Analysis is not of particular consequence so far as the value of the form as such is concerned.

Payment may be made by simple form of bank check, or by a voucher check, which is a combination of voucher form and bank check; or there may be a modification of the latter in the way of a check form bearing upon one end of the obverse, or on the reverse thereof a printed or rubber-stamped form with ink entries, showing just what invoice the check covers, also any deductions in the way of discounts, freights, etc., that may have been taken off. Under fitting conditions a Check Voucher can be employed, equipped with a narrow edge for binding (in a modern type of loose-leaf binder which can bind within a half-inch space); these can be maintained in alphabetical form during the current month and posted in ledger style with such invoices as are passed for payment and entered in the Purchase Analysis. As a voucher is ready for payment, it is abstracted from the "Accounts Payable" binder, imprinted with the name of the bank, given the next consecutive check or voucher number, entered on the Check Register (Figure 17), and in due course sent to the payee. Upon its return from the bank, together with other paid vouchers, it is filed chronologically under the creditor's name, thus presenting the equivalent of a continuous

Digitized by Google

ledger account by settlements with each creditor and eliminating the need of an index.

In the absence of such a plan it is quite usual to preserve in a place apart those invoices which have been entered in the Purchase Analysis. This "unpaid bills" file is then to be treated with due respect and no invoice abstracted therefrom without a "dummy" being left in its place, or perhaps a memo being left for all invoices of a given date or page of the Purchase Analysis. An instance of use of this latter plan is the case of the Stores Ledger clerk taking a number of invoices for entry on the Stores Ledger records (Figure 32). Where invoices are so cared for, they present the equivalent of a "going" ledger account and can always be used in connection with balancing or reconciling the "accounts payable" group in the General Exhibit (Figure 15).

This record can be in the form of loose leaves in a binder or in a bound book with the entire form on a single page or spread across a folio, as may be desired. Furthermore, the long-and-short leaf idea described in Chapter VI may be employed if the designer of the record so elects.

The grouping of the columns in Figure 19 is in accordance with the chart shown in Figure 9 and is so arranged that the totals of each group may be carried to the General Exhibit (Figure 12). In considering the construction of the form it will be noticed that the heading shows the month and that at the right-hand corner is shown the page number and the folio and the line number of the General Exhibit to which the totals are transferred.

The "Check Mark" column immediately preceding the "Invoice" column is for indicating that the invoice

Digitized by Google

has been paid. In practice this can be done quickly and is effective without having to wait for the, probably later, operation of showing the record of payment.

The "Invoice" column shows the date and the amount of the invoice. The total of the amount column becomes the credit to the "Accounts Payable" column in the General Exhibit.

Next to the "Invoice" column are four check mark columns for indicating what O. K.'s have been affixed to the invoice at the time of its entry. This is not an essential but is a convenience in putting work through before all necessary preliminary details have been performed. The record then shows what, if anything, is lacking that it may later be supplied.

In the "deductions" group is a column for Freight and one for any other items. In effect these are but memoranda columns and have no part in the equilibrium of the page. In the case of the "Freight" column the total is ringed to show that it is not to be so considered; it may, however, be used as the basis of an entry in the General Exhibit, charging Accounts Payable and crediting Manufacturing Expense Account (241), provided the deductions come clean-cut and with no semblance of complexities. The "Account" column is used to show the freight bill number or any other symbol or very terse descriptive matter.

It may seem quite impossible, but it is nevertheless true, that where freight bills are not sharply checked against the invoices or shipments to which they are related, there is frequently double payment of the same item.

Under the head of "Payment" are two columns: one for the check or voucher number and the other for

Digitized by Google

the date thereof. These are usually filled in when opportunity presents and, when a subordinate clerk is available, the duty is usually intrusted to such, provided he be fairly accurate. It is at this point where the Check Register (Figure 17) "Accounts Payable" debit column becomes in effect a part of the Purchase Analysis

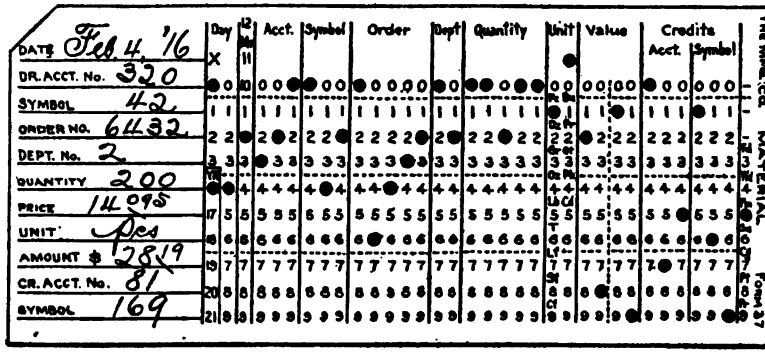


FIG. 37.—Punched Card for Material Issuances

to the extent of showing the payment of the individual invoices, or vouchers, as the case may be. One author goes so far as to provide under a heading "Settlements" column headings for all that the present volume shows in Figure 19 and in addition a separate column for settlement by notes payable and a separate column for returned purchases of each of the various classifications shown in the purchase section. This might be well if three-quarters or one-half of the purchases had returns and other deductions to consider or were most largely paid by note, but under normal conditions it is open to grave doubt if so many columns usurping the functions of the Check Register do not confuse conditions rather than clarify them.

Digitized by Google

An adding machine list of all unpaid or "open" items on the Purchase Analysis should articulate with the controlling account of the Accounts Payable in the General Exhibit and also should agree exactly with the invoice of the "Unpaid Invoices" file.

The remaining columns to the right constitute the distribution media; first come the various groups of stores accounts, then the various groups of accruing expenses, and finally the "other accounts" group, the operation of which has been discussed in preceding chapters.

Types of Entries

On line 1 is an invoice for insurance, the cost of which is passed to the "suspense" group to be held pending its accrual, a portion being absorbed into "expense" each month, as further discussed in Chapter XVIII. A similar item appears on line 10, the nature being that of perhaps billboard advertising paid for in advance, and again on line 18, theater program advertising paid for in advance. It would have been permissible to show these items under "Accruing Expense" and later to transfer them to where the present plan charges them, as is set forth in further detail on page 329. This different handling is done at times where some question arises as to just where the item properly belongs, and it is not convenient or desirable for the moment to look it up.

On line 4 appears the entry of the cashier's imprest voucher, the distribution thereof being entirely in the "Accruing Manufacturing Expense" column in an encroaching entry tied by a bracket, the point of which is in line 4.

Digitized by Google

THE MANUFACTURING COMPANY

MATERIAL CARD

No goods to be issued or used from stock without a card being made to cover same.

Separate cards must be issued for each individual shop order number for which goods are required

As far as possible draw the exact amount needed, and replace broken or spoiled material by a separate card.

Issued by_____ Department

on STOREKEEPER, (date)_____ 19__

For goods to be used on Shop Order No. _____

REQUESTED BY	AUTHORIZED BY
NO.	FOREMAN
FILLED BY	GOODS RECEIVED BY
ENTERED STOCK LEDGER BY	ENTERED COST RECORD BY

ARTICLE	TO BE USED ON		PIECES	WEIGHT	BIN	COST RECORD			
	NO.	SYMBOL				PRICE	PER	EXTENSION	

FIG. 38.—Material Card (Front and Back)

Digitized by Google

Line 5 presents the entry of an item for patent attorney services, the charge being capitalized under "patents" (440). Line 7 presents an invoice against which a credit memo is shown in the "deduction" column in memorandum form; the positive entry of this credit memo is on line 28, passing credit to the same account which the invoice of February 4 shows a charge against. As the credit bears the date of February 3, it is to be presumed that it applies on a previous invoice not shown in the present form, but is being "used" at the first opportunity.

Large concerns entitled to a credit with the railroad companies do not pay individual freight bills, but make settlements at stated intervals. Where this is done, a duly drawn settlement sheet is usually prepared and is quite as usually given a progressive number. This settlement sheet is practically an abstract of the bills it is desired to pay. In some cases the charges of the settlement are arrived at, and those items of "in" freight which are to be charged to shippers are segregated from those items which are to be absorbed by the consignee.

The former are then charged to a Freight in Suspense Account, and the latter to Manufacturing Expense; in like manner the "out" freight is segregated between what the company stands and what is charged to the customer. A freight settlement is entered on line 16, but in this instance the charge is divided only between "in" freight and "out" freight, or perhaps still finer, as some "out" freight might be chargeable to Manufacturing Expense, as in the instance of raw material returned to seller or possibly shipped to some outside job which the company is working on.

Digitized by Google

Where the charge is divided only between manufacturing and commercial costs, as shown in the present example, the items of freight chargeable against supply houses are duly entered against such (as shown on lines 3, 11, 20, and 26 of Figure 19) and the total of the column ($233.68) becomes a credit to Manufacturing Expense and a charge to Accounts Payable. In this way there is always a chance of failure to show the item in the column and to deduct it from the shipper, whereas under the plan of a Freight in Suspense Account the item would remain in the account and show as a charge until it was properly "absorbed."

On line 17 appears an item, the settlement of which was made by a contra account as described in preceding paragraphs concerning the twenty-third line in Figure 16.

The entry of a pay roll is shown on line 19; this, as is elsewhere discussed, is not an ideal plan, particularly when daily or periodical summaries of labor are made after the manner of Figure 80. Where the pay roll is to be entered on the Purchase Analysis, it is not usual to discriminate between Accounts Payable (512) and Accrued Labor (514), as the present plan contemplates. It will be noticed that both the debit and the credit columns of "Other Accounts" are here brought into use and that the "Invoice" (Accounts Payable) column is not used at all. The entry is shown on Figure 19 merely to bring out the point.

On line 21 appears an entry a little out of the ordinary in charging certain hypothetical name plates for a special machine to an order in process (Order No. 2745). Except in extraordinary cases all purchases of

Digitized by Google

material should be at least theoretically passed through the storeroom and issued only on requisition or bill of material in regular form.

Charges against reserves set up for the purpose of maintenance (562) are shown on lines 22 and 27; beyond this the entries show merely ordinary routine items of "material," "supplies," and "expense."

Summary of Entries

Line No.			Debit	Credit
1.	Insurance paid in advance	(450)	$ 215.75	
2.	Brass Castings	(74)	92.40	
3.	Coke	(70)	1,625.00	
4.	Direct Expense Charge, Dept. 3	(103)	3.80	
	Factory Supplies	(137)	1.65	
	Miscellaneous Mfg. Expense	(145)	9.27	
	Postage	(182)	50.00	
	Printing and Stationery	(184)	3.40	
	Traveling Expense	(186)	75.00	
	Subscription and Donations	(187)	9.50	
5.	Patents	(440)	75.00	
	Accounts Payable (5 lines)			$ 2,160.77
6.	Files	(76)	82.40	
7.	Sheet Iron	(74)	7,648.15	
8.	Buildings	(432)	9,800.00	
9.	Lumber	(72)	2,425.00	
10.	Advertising paid in advance	(454)	275.00	
	Accounts Payable (5 lines)			20,230.55
11.	Pig Iron	(70)	1,832.50	
12.	Lumber	(72)	2,642.75	
13.	Sand Paper	(76)	76.80	
14.	Commercial Agency	(702)	50.00	
15.	Shipping Boxes	(710)	92.50	
	Accounts Payable (5 lines)			4,394.55
16.	Freight Inbound	(141)	109.25	
	Freight Outbound	(712)	219.20	
17.	Elapsed Time Calculator	(400)	125.00	
18.	Program Advertising	(454)	35.00	
	Accounts Payable (4 lines)			488.45

Digitized by Google

THE MANUFACTURING COMPANY

EXCESS MATERIAL

Goods over and above quantities shown in Detail Specification will be issued from stock on this form of card. This includes replacements of broken or spoiled material or semi-finished parts.

Use separate card for each shop order.

Issued by_____ Department

on STOREKEEPER, (date)_____ 19___

For goods to be used on Shop Order No. _____

REQUESTED BY	AUTHORIZED BY
NO.	FOREMAN
FILLED BY	GOODS RECEIVED BY
ENTERED STOCK LEDGER BY	ENTERED COST RECORD BY

ARTICLE	TO BE USED ON		QUANTITY			COST RECORD				
	NO.	SYMBOL	DREW	RET'D	USED	PRICE	PER	EXTENSION		

FIG. 39.—Excess Material Card (Front and Back)

Digitized by Google

19.	Goods in Process.....(312, etc.)	34,921.18	
	Manufacturing Expense.....(100)	2,926.92	
	Commercial Costs.....(700)	215.00	
	Accrued Labor.....(515)		38,063.10
20.	Milling Machine.....(404)	825.00	
21.	Special Name Plates.....(340)	7.50	
22.	New Roof on a Building.....(562)	135.00	
23.	Water Bill.....(130)	26.90	
24.	Waste .....(136)	3.50	
25.	Shipping Cartons.....(710)	68.50	
	Accounts Payable (6 lines).....		1,066.40
26.	Steel Rods.....(74)	9,428.19	
27.	Repairs to an Engine.....	125.00	
28.	Sheet Iron returned.....	*Cr. 135.18*	
	Accounts Payable.....		*Dr. 135.18*
29.	Pig Iron.....	7,642.19	
30.	Angle Iron.....	4,641.75	
	Accounts Payable (4 lines).....		21,837.13
		$88,405.77	$88,405.77

The Accounts Payable credit every fifth line, more or less, is to put entry in the form of an ordinary journal entry and has no further significance. If it were not likely to be the cause of haziness, but one credit would have been shown for the twenty-four lines embodied in the five totals. A proof of the "Purchase Analysis" column totals after all the foregoing entries are in shows as follows, viz:

Debit	Credit
$11,099.69	$50,342.67
5,067.75	38,063.10
21,675.31	
159.20	$88,405.77
3,219.19	
645.20	
260.00	
525.75	
45,753.68	
$88,405.77	

Digitized by Google

CHAPTER XI

SPECIFIC ORDER PRODUCTION

Characteristic Features of Specific Order Plan

The specific order plan of cost finding is at once the most simple and the most complex of the various methods of finding costs. Its simplicity lies in its directness, for the material and labor consumed and the expense incurred in the production on a specific order number are, so far as possible, applied directly to that order number. Its complexity is due to the fact that every order number must be treated separately, and this involves a multiplicity of detail, a close watch, and an accurate record beyond that required by any process methods of cost finding.

The specific order plan of cost finding is an ideal system where it can be economically employed. It is the most accurate of all systems, for every cost incurred on a particular job is charged to that job. This largely avoids the averaging, the estimating, and the reservations for variations, characteristic of every other adequate system.

The application of the specific order plan of cost finding requires certain conditions, not only of product, but of administration. The product must be one in which each order number can be kept separate and dis-

Digitized by Google

tinct from all other order numbers. Beyond this, as each order number is treated separately, it requires a large amount of detail work, a sharp distinction between order numbers, an equally sharp division of costs, and an accurate record. Because this sharp, detailed precision of operation will not be enforced, the system cannot be used in many cases where it might otherwise be advantageously employed. The specific plan of cost finding is, as stated, the most accurate of all systems when properly carried out, but is less accurate than most others when it is not properly carried out.

When the specific order system is used, the detailed charges to each department order number must, at the end of the month or cost period, tally with the total departmental charge for that month or cost period, a condition which, while invaluable for checking purposes, requires an absolute precision and unvarying attention to details which cannot always be secured.

Under the specific order system the material used in each order number is charged to that order number at cost.

Supplies used for a certain order number are similarly charged at cost. In this the specific order plan does not differ in any way from other systems of cost finding.

As in the case of material, labor required for the production of a certain order number is charged to that order number at pay-roll cost. Thus, if a certain order number requires the attention of a skilled mechanic receiving $4.50 for an eight-hour day and the services of an assistant at $2.00 per day, each for four hours, the job is charged $2.25 for the skilled labor and $1.00

Digitized by Google

THE MANUFACTURING COMPANY

SEMI-FINISHED GOODS

On parts that have been made ahead in quantities for stock, no goods to be issued or used from stock (no matter where the stock is kept) without a card being made to cover same. Separate cards must be issued for each individual shop sub-order for which goods are needed. As far as possible draw the exact amount needed and replace broken or spoiled goods by a separate card.

Issued by _____ Department,

on STOREKEEPER (date) _____ 19__

For goods to be used on Shop Sub-order No. _____

REQUESTED BY	AUTHORIZED BY
NO.	FOREMAN
FILLED BY	GOODS RECEIVED BY
ENTERED STOCK LEDGER BY	ENTERED COST RECORD BY

PART	SIZE	SYMBOL	PIECES	Dept.	BIN	COST RECORD			
						PRICE	PER	EXTENSION	

Fig. 40.—Semifinished Goods Card (Front and Back)

Digitized by Google

for the services of the assistant. In other words, the job is charged at cost for what it gets.

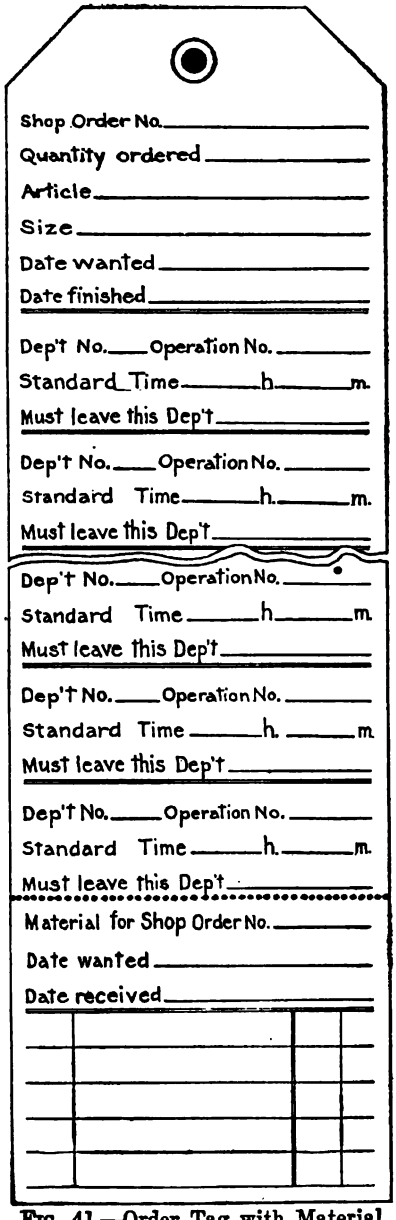
For its proper operation the specific order system requires continuous employment, as otherwise idle time must be provided for. Where idle time is unavoidable, it is distributed as part of the expense overhead within the individual department.

Under the specific order plan of cost finding, expense is charged to each separate order number in equitable proportion. The proportion may be determined by any of the methods for expense diffusion discussed in Chapter XVII, though for general purposes the man-hour method will be found the most accurate and satisfactory; or where machines are largely used, the machine-hour plan of expense distribution may be employed so far as machine work is concerned.

In the application of the specific order plan of cost finding, other plans may be utilized in part or even in whole. Thus in one department the machine-hour will perhaps be employed; in another department the sold-hour plan; and in another department the list percentage or standard cost plan. Such diversity of plans in one establishment is but seldom found, but the use of two plans of more or less distinctive characteristics in a single establishment is frequent. On the other hand, a single plan might be employed, as for instance, the machine-hour plan; for, broadly defined, the specific order plan is merely a method of finding accurate costs for specific order numbers, and these costs may be ascertained by any plan of cost finding that will meet this requirement.

It will be noted that the specific order plan and what is called the "estimate and test" plan of cost finding

Digitized by Google


Shop Order No.
Quantity ordered
Article
Size
Date wanted
Date finished

Dep't No. Operation No.
Standard Time h. m.
Must leave this Dep't

Dep't No. Operation No.
Standard Time h. m.
Must leave this Dep't

Dep't No. Operation No.
Standard Time h. m.
Must leave this Dep't

Dep't No. Operation No.
Standard Time h. m.
Must leave this Dep't

Dep't No. Operation No.
Standard Time h. m.
Must leave this Dep't

Material for Shop Order No.
Date wanted
Date received

FIG. 41.—Order Tag with Material Requisition Coupon

are almost diametrically opposed. Under the "estimate and test" plan the first estimates are usually but little more than guesses, not provable by balance and only subject to correction by later tests. Under the specific plan, on the other hand, nothing is done by guesswork, but each and every item entering into product is carefully weighed or measured, and at all times, and at all points, if properly operated, its results are subject to proof by balance.

PRODUCTION ORDER FORMS

The importance of the particular shape or form of the production order depends entirely upon what functions are dependent upon it. In practice it ranges from a mere informal notice to begin operations upon a certain job up to a complete controlling and cost analyzing arrangement for a specific order. Its primary pur-

Digitized by Google

pose is to substitute written for verbal instructions, so as to avoid mistakes. Besides this, it may be so designed as to describe the order, state the material, patterns, and dies needed, show its consecutive place in a numerical system of identification, plan the work as to time and department, trace the work at any stage, report the actual production and classify it as "good" or "defective," collect cost details as they are incurred, and also show their distribution. It is not recommended, however, that the form be used for all these purposes.

A typical form for use in connection with the specific order plan is shown in Figure 41 and further discussed in Chapter XVI. If instructions as to minute details are necessary, these can be handled by means of sub-orders bearing the controlling order number, or numbers. If the work is well systemized in the factory, the sub-orders may be issued to the various departments concerned simultaneously with the issue of the controlling order; this then, besides giving necessary instructions, apprises them of the date the order is presumed to reach them, before the controlling order comes into their possession, thus preparing them for its reception and fulfillment.

If the production order is used to record the cost in addition to regulating the production, the form should be designed to show the material used, the labor time and cost, and the proper proportion of expense overhead. Provision may also be made for the classifying of such special indirect expenses as can be charged directly to the order. The design should be such that the cost clerk may arrange the data and ascertain the total cost of the order directly on the form. The order then becomes the cost sheet also and serves the purposes both of collection and compilation.

Digitized by Google

Cost Sheets

The work done by the cost clerks under the cost sheet plan, no matter what the particular ruling may be, is usually of the simplest kind, and its difficulty is a matter of quantity only. Though the various steps of the process may seem to form a complicated whole, the process as a whole is simple and consists of five steps: the posting of values to cost sheets from tickets or cards for (1) material, (2) labor, (3) sundries, (4) totalizing the cost sheets when the work is completed, and (5) summarizing the totals of individual order numbers to ascertain that "the sum of the parts equals the whole" amount charged in the Goods in Process (controlling) Account.

While the author has no argument against the present plan, it is not suited for work of a homogeneous nature, or where details of costs of every separate order are not required. As the factory product is built up from separate items of "material," "labor," and "sundries," the items multiply to such an extent that it becomes almost prohibitive to post it all in detail, and careful planning of cost finding arrangements along other lines can effect a large saving in clerical labor, can still not only retain the "proof by balance" plan, but improve the means of ascertainment, and need resort to detail posting only when a complete subdivision of cost is desired. Such a plan is discussed in the section immediately following.

The Production Register

Under certain local conditions and with product of a certain character it may be found advantageous to use

Digitized by Google

what is called a "Production Register" instead of a series of job cost sheets. Figure 20 represents a form of Production Order Register which, if properly used, articulates with the subsidiary records discussed in the present volume. As many lines as necessary may be allowed for each succeeding shop order as it is entered, the number required in each case depending on the character of the work, the complexity of the numbers involved, and also whether the labor reports are collated and added before entry or whether such entries are made in detail on the Production Register. If a certain job is held up for any reason, there are, of course, no time tickets on the job and no entries in the Production Register until work is resumed.

By using various colored inks for entries (one color for each month or cost period) there is no difficulty in separately footing the figures of the various months or cost periods, even though certain jobs, as is quite usually the case, run over from one cost period to another, or, as not infrequently happens, run into a third or fourth. On Figure 20 appear certain characters in lieu of colors which are intended to illustrate the use of the color scheme. A circle crossed by a line is used in each case, the position of the lines being indications as follows, viz: downward and to the left for the first month and representing, let us say, purple; horizontal for the second month and representing green; downward and to the right for the third month and representing blue.

It will be noticed that the page of the Production Register provides for four separate footings, its footing lines being intended respectively for the first, second, third, and fourth months or cost periods. When all the time report totals have been entered for the monthly

Digitized by Google

cost period, the totals can be taken for the various sheets of the Production Register and from them a grand total or summary. This grand total must, of course, exactly equal the amount of the costs that have been entered, and as a precautionary measure should be checked from the other records, which show the total of material issued, the total pay roll, overhead expenditures, etc. The next month the operation is the same, the picking-out of intermingled figures for the different totals being aided by the different colored inks. In this way a controlling record is maintained. Orders that, by any chance, are still in process unfinished at the end of four months can be carried forward to a new sheet.

THE MACHINE KNIFE COMPANY

Before Starting Work, Read Carefully

ORDER No._____ Date_____

Kind and Number

Length Width Thickness Temper

Bevel

Depth and Width Slot

ORDER No. Kind, Number, and Size

MATERIAL		ORIGINAL AMOUNT	AMOUNT USED	SCRAP	MATERIAL	ORIGINAL AMOUNT	AMOUNT USED	SCRAP
CAST STEEL	A				WOOD			
	B				THIN IRON			
	C				SOFT STEEL			
	D				BAR STEEL			
	BAR				SHEET STEEL			
LAID STOCK	PLANER				IRON: REFINED			
	PAPER				IRON: COMMON			
	CHAIR LEG				MISCELLANEOUS			
	BUILT UP							
	BARS							

FIG. 42.—Order Tag with Material Report Coupon

Digitized by Google

Ordinarily a separate series of sheets is maintained for each separate department of the factory; when this is done, the sheets of each department will show only such production order numbers as are to be worked on at all in that particular department. Or again the sheets can be arranged in such manner that only one month's records appear on any one sheet, the "total to date" amount being carried forward to the succeeding month. In this connection, under certain conditions it may be a convenience to use the colored ink scheme as applied to different producing departments instead of to months. Figure 20 is so arranged that either of these conditions may be assumed in studying the form.

The Production Register is in effect an exhibit of every producing department, showing for each the total amount of material used and the total productive labor costs. In the case of each of these costs a comparison can be made with the controlling columns in the General Exhibit, thus establishing the accuracy of the totals of all forms directly involved.

It is sometimes advantageous to arrange the ruling of the Production Register so as to allow from three to six lines for each month for each production order, on which its cost items may be properly posted. It is usually better, however, particularly where time records are used, to collate all the charges for labor and for material upon a sheet specially ruled for the adding machine and to enter them by totals on the Production Register. There will be no entries on the Production Register until the end of the current month or cost period, save when, in the interim, costs are desired on the conclusion of some particular order.

Even when "interim" costs are desired, it is not

Digitized by Google

essential that the cost figures be entered on the Production Register before the end of the month or cost period, as the results may be obtained equally well by the use of a memoranda sheet. The Production Register is not designed for quick reference to the costs of particular order numbers, but is intended primarily for the collating or the assembling of the different cost figures into a complete whole, thereby securing a total of all orders in a particular department for statistical and comparative purposes and for entry on the general books.

The debit charges to the Production Register usually are entered at the close of the month or cost period. At this time the cost cards or coupons which have accumulated under the various order numbers during the period are removed from the card tray files of each department. One order number at a time is taken up, and the respective cards for castings, finished parts, material, and labor, belonging to that order number are, for each department, separated into individual piles. Then each class is in turn totaled on the adding machine, and the totals are accumulated in the lower "counter" of the double adding device to arrive at a total for each order number for use in the controlling record.

For this purpose a large sheet of paper properly prepared is inserted in the adding machine, and the order number is typed at the head of the first column. The operator then takes the cards coming from the department in which the particular order was put in work. The castings or the finished parts cards or coupons are first selected, and the total money value, which each card or coupon represents, is listed upon the sheet. When all such cards have been listed, the column is

Digitized by Google

totaled, the footings showing the money value of the castings or finished parts used, as the case may be.

The operative then proceeds in like manner to list the other cards. In the case of machine time or labor cards the operative will, if a "split" adding machine is used, list the workman's clock number, the hours and minutes (or tenths) involved, and the money value of the time, the totals then showing the full time consumed on

A BRICK CORPORATION Kilns at _____

Report of Supplies drawn from Stores _____ 19__

	QUANTITY	ARTICLES	USED FOR	THESE COLUMNS FOR MAIN OFFICE							
				ACCOUNT	PRICE		COST		✓	✓	✓

Fig. 43.—Report Form for Material Used

the particular order number and the money value of this time. (See under Pay Summaries, page 292, for differences and disposition of odd cents.)

After the listing of the data from the first department, the cards of the same order number in each succeeding department are treated in like manner, so that on the conclusion of the operation the adding machine sheets will show all the prime departmental costs of a given

Digitized by Google

shop order, grouped in one place and susceptible of a grand total if desired.

When all the cards of the various shop order numbers have been listed, the totals for all the departments of each classification are entered in the proper columns of the Production Register on the lines devoted to the particular order number.

Diffused expense against each individual order in each department, as explained in Chapters XVII and XVIII, is entered in the proper column of the Production Register. The total of the diffused expense column of each department must articulate with the expense charge against that department within the limitations set forth, beginning with page 311.

All the debit columns of the Production Register must agree with the equivalent debits in the synthetical accounts of the General Exhibit.

Credits of the Production Register

The credits of the Production Register cannot be proved by comparison with the entries of the General Exhibit as in the case of debits, the General Exhibit containing no equivalent accounts.

Credit is given to "Goods in Process" in the Production Register when individual orders are completed. To do this the total respective costs by departments of finished parts (which includes castings), raw material, direct labor, and diffused overhead charged to such order number must be determined.

These several totals covering, perhaps, one or more months are then entered under the corresponding credit columns of the Production Register, the individual totals

Digitized by Google

thereafter being shown as an offsetting debit in one or another of the columns headed "Finished Parts," "Finished Product," or "Various," according to the nature of the finished order. In Figure 20 the totals shown are as follows:

		Debit	Credit
First Month, Order No. 6433	$25.63		
Finished Parts		$ 25.63	
Material in Process			$ 8.12
Labor in Process			8.25
Overhead in Process			9.26
Second Month, Order No. 6432	$ 74.24		
" " 6719	17.53		
" " 7031	15.94		
	$107.71		
Finished Parts		107.71	
Parts in Process			28.19
Material in Process			24.37
Labor in Process			29.72
Overhead in Process			25.43
Third Month, Order No. 6528	$112.03		
" " 6764	41.17		
" " 7503	122.28		
	$275.48		
Finished Parts		41.17	
Finished Product		122.28	
Factory Machinery (404)		112.03	
Parts in Process			87.54
Material in Process			28.51
Labor in Process			88.77
Overhead in Process			70.66
		$408.82	$408.82

The bookkeeper will get his monthly or periodical credit entry for Goods in Process by means of a recapitulation sheet made up from each monthly sheet

Digitized by Google

of the Production Register. The offsetting debit will be taken from the totals of the distribution columns. The "other accounts" may be taken from individual postings, or the column may be analyzed and the totals for each separate account be shown on the recapitulation sheet.

At the close of each month or period the controlling record will be filled out as a proof of accuracy both as to the footings and as to the extensions on the individual sheet and of the work as a whole. The net value of each order in process will be carried to the right-hand side of this sheet to the column headed, "Values Still in Process." The grand total of such columns embracing all departments should exactly equal the net amount shown under the "goods in process" group in the General Exhibit.

The "goods in process" group of accounts is perhaps the most important group in the general plan of the cost system, if one can be classed as more important than another where each and all are necessary to the finding of actual costs. They are the controlling accounts of the General Exhibit, which both in theory and in fact "articulate" more closely with the Production Register than do any other records.

A mistake in the Goods in Process Account is more serious than a mistake in almost any other account, since it means a wrong cost computation on some particular part of the product. On the other hand, the possibility of error in the Goods in Process Accounts is not so great as in some other accounts, because primarily of the greater care taken with these more important accounts and because the origin of entries is so nearly alike in both the Production Register and the

Digitized by Google

General Exhibit that a ready proof by balance is at hand.

Mechanical Aids

Under the "controlling record" group in Figure 20 may be seen columns for "Totals this Month," "Inventories," "Totals to Date," and "Values Still in Process." These several totals are arrived at in various ways according to the mechanical devices employed. Where a perforated card sorting and tabulating system (Figures 35, 36, and 37 and Figures 68 and 69) is employed, the cost cards for the month or cost period are allowed to accumulate in front of a guide card bearing the production order number, and at the end of the period they are removed, one order number at a time, and put through the automatic tabulator, a total being had for each element (parts, material, labor, and overhead), these totals then being entered in the Production Register under "totals this month." If the device be equipped with a quick-change electrical "controller," these cards can advantageously be again put through the machine so as to accumulate the grand total of the parts, material, labor, and expense, which constitute the "total this month." This grand total having been duly entered, the cards are then temporarily laid aside in a file with what is called an automatic "stop card" between each production order number. When the last order number on the sheet has been duly recorded, all the cards for that sheet are again put through the device and thereby is obtained a page total for each element—parts, material, labor, and overhead—together with the total elapsed time.

By having "stop cards" between each order the

Digitized by Google

BILL OF MATERIAL Date_____191_ Order No.____ Quantity_____ PATTERN 429

NO.	NAME OF ARTICLE	No. To UNIT	DESCRIPTION	COPPER FINISH	BRASS FINISH	NO. FINISH		LIST	EXTENSION
100	Nails for front hole End Irons	2	⅝ No. 16 Escutcheon Pins						
101	" second and fourth hole End Irons	4	1¼ No. 13 " "						
102	" third hole End Irons	2	2¼ No. 13 " "						
103	" top center, lower front & rear shelves	12	5d. coated Nails						
104	" Combination Shelf	4	2-in. No. 18 Finishing Nail						
105	" front hole Comb. Caps	2	⅝ No. 16 Escutcheon						
106	" back " "	2	1-in. No. 13 "						
107	" ends of backs	10	⅞ Barrel Nails, Coated						
108	" lower edge of backs	5	3d. coated "						
109	" rear of bottoms	4	⅞-in. Cigar Box Nails						
110	" front of bottoms and felt strips	10	½-in. " " "						
111	" Glass Stops	15	½-in. No. 20 Brads						
112	" Base Braces	4	3d. coated Nails						
113	" Brackets for Equalizer	1	½-in. No. 16 F.H. bright						
114	Roller Screws	2	No. 9715, special Roller Screws						
176	Book Guards for H Units	2	15-in. long						
178	Door Catch for A-W. Lock	1							
179	Screws for Locks	5	½-in. No. 4 R.H blue Screw						
180	Nails for Base Lock	2	1¼ " 13 Escutcheon Pins						
181	" "	3	½ " 16 F.H. bright						
182	" Lock	4	1 " 16						
183	Guard for Vertical Rod	1							
184	" Base Rod	1							
185	A-W. Base Lock for C	1							
186	" " D	1							
187	" " E	1							
188	" " G	1							
189	" " H	1							

FIG. 44.—Bill of Material

Digitized by Google

device automatically stops at the end of each order; the pressure of a key starts it again when desired. In that type of automatic adder which is equipped with a listing attachment there is no stopping of the mechanism; the totals are automatically printed whenever a "total-card" is encountered. After this the device proceeds, automatically, to list the cards of the next order number. When several order numbers have passed through the device, time can be economized by the operative while the machine proceeds, by removing from the machine the cards for those order numbers and filing them in the file from whence they were taken, this time putting in the file an indicator of some kind to show which cards have already been "used." Credits are then handled after the same manner.

Another mechanical means for accumulating totals is a seventeen-column, unlimited-split duplex adding machine. Where this is used, the cost cards or coupons or paper slips need not be punched, as they are not to be handled automatically. However, the card drawers or trays are handled in practically the same manner as previously described. The machine, within its limitations, is "split" to accommodate such headings as are found under the "cost charges" group; if this be impossible at one operation, then two operations must be made of it. The cards of each order number are listed in their turn as described in a previous section, the totals of each order number being "transferred" to the "lower counter." In this manner the elemental totals of each order number are arrived at and also, in the lower counter, are accumulated the column totals thereof. This being done, the cards can be returned to the card files, the subsequent calculations being done from the Production Register and the adding machine strip.

Digitized by Google

From the adding machine sheet or strip the elemental totals are copied on the Production Register. Next the adding machine sheet or strip is taken to the adding machine and from it are listed the totals of the various and several items of elemental costs, listing one order at a time. The total of each order is registered by depressing the "transfer total" key, the effect being that while the total is printed, it also is transferred into the lower counter for accumulation of the column total for the page. When a "transfer total" has been registered, the operator tilts back the carriage to see the total and, in another part of the "split" keyboard, he copies such total, registering it in the upper counter; to this he adds the "total debits to date" of the previous month, as found in the Production Register. He then transfers this total to the lower counter and proceeds to handle similarly the credits if there be any; if not, he proceeds in turn to the next order number. In this way he arrives at "totals to date" separately and collectively.

These totals being entered upon the Production Register, the "value still in process" can be mentally arrived at.

Where no mechanical aids are present, these various operations are, of necessity, done by mental calculation, each order number being "cross-footed" to arrive at the "totals this month," then the "totals to date," and lastly the "values still in process." The net difference between the total debits to date and the total credits to date is the value still in process and it, therefore, should exactly articulate with the total of the "Values Still in Process" column. If it does not, then the discrepancy should be located.

Digitized by Google

Month	Order No.	Totals to Date Debit	Totals to Date Credit	Value Still in Process
February	6432	$ 67.46		$ 67.46
	6433	25.63	$ 25.63	
	6528	57.71		57.71
		$150.80	$ 25.63	$125.17
March	6432	$ 74.24	$ 74.24	
	6528	90.32		$ 90.32
	6719	17.53	17.53	
	6764	36.89		36.89
	6927	42.74		42.74
	7031	15.94	15.94	
		$277.66	$107.71	$169.95
April		$112.03	$112.03	
		41.17	41.17	
		42.74		$ 42.74
		55.70		55.70
		122.28	122.28	
		29.40		29.40
		$403.32	$275.48	$127.84

The group of columns headed "Inventories" is not positively essential and is merely a memoranda space for recording progress of the work where such information may be desired.

Summary of Entries

	Order No.	Time	Money	
February	6432	16.6	$28.19	
		19.8	12.47	
			6.43	
			5.81	
			7.91	
		36.4	6.65	$ 67.46

Digitized by Google

THE MANUFACTURING COMPANY

Cost Department :— Date _____ 19__

The following named finished parts have been received from Department _____ and stored for future issuance on Finished Parts Card.

_____ Storekeeper

Date		Shop Order No.	Part	Size	For Machine No.	No. Pieces	Stored	Price	Value		

THE MANUFACTURING COMPANY

Date _____ 191__

Cost Department :—

I hand you herewith the following named material coupons for which material has been issued.

_____ Storekeeper

Order No.	Goods in Process Dr.		STORE ROOM CR.																	
			Iron C'st'gs		Steel C'st'gs		Mall. C'st'gs		Brass C'st'gs		Bar Steel		Bar Iron		Screws		Sundry Material			

FIG. 45.—Storekeeper's Receipt for Finished Parts (Upper Figure)
FIG. 46.—Summary of Material Issuances (Lower Figure)

Digitized by Google

	6433	27.8	$ 8.12	
			8.25	
			9.26	25.63
	6528	35.6	$22.40	
			9.24	
			14.25	
			11.82	57.71
Totals first month		99.8		$150.80
March	6432	8.2	$ .65	
			3.28	
			2.85	$ 6.78
	6528	42.7	$18.64	
			13.97	32.61
	6719	17.3	$ 4.85	
			6.92	
			5.76	17.53
	6764	20.5	$22.19	
			8.22	
			6.48	36.89
	6927	41.6	12.80	
			16.09	
			13.85	42.74
	7031	12.9	$ 6.40	
			5.18	
			4.36	15.94
Totals second month		143.2		$152.49
April	6528	28.3	$12.25	
			9.46	$ 21.71
	6764	6.3	$ 2.67	
			1.61	4.28

Digitized by Google

7328	47.4	$16.10	
		4.28	
		18.95	
		16.37	55.70
7503	81.8	$42.95	
		19.27	
		32.74	
		27.32	122.28
7591	23.4	$12.75	
		9.37	
		7.28	29.40
	187.2		$233.37

Digitized by Google

CHAPTER XII

PROCESS PRODUCTION

Characteristic Features of Process Production

The present chapter presents the subject of process production controlling records on a purely synthetical basis, owing to the wide range of plans and methods of analysis possible in mass production, or process production, in which the goods under any specific order numbers either are not easily distinguishable, or follow each other in such rapid succession, or in groups of such similar characteristics, that the product can, for costing purposes, be handled in mass more conveniently than by specific order numbers.

Where a process system of records can be used, it is simple and effective, but it is advantageously employed only with products of reasonable stability as to production costs and conditions, since it lacks the quick sensitiveness to cost variation that a specific order cost finding plan has.

A well-rounded-out process system can be used to advantage only in processes in which, under the conditions and efficiency standards existing in the individual plants, maximum possibilities and the minimum departmental working requirements are known. With such processes the more or less exact sequence in the movement of goods in process from one operation or department to another may be intelligently anticipated,

Digitized by Google

Material Cost Summary, Month of *February, 1916.*

Progressive Sheet No. 16
Entered Exhibit, Folio 2 Line 28

Department No. 1		Department No. 2			Department No. 3			Department No. 4			Manufacturing Expense		
Order No.	Material	Order No.	Castings	Material	Order No.	Parts	Material	Order No.	Parts	Material	Account No.	Material	Supplies
6325	125.32	6201	25.13	217.85	6221		277.81	6213	1,521.07	116.21	136		62.47
	306.78		45.87	203.78			201.01		124.18	5.01			12.85
	279.43		84.21	476.13			87.32		802.13	78.09			19.41
	87.21		18.35	125.73			125.78		75.01	3.01			5.85
	501.70		2.07	206.01			401.79		201.18	24.03			37.19
	123.54								17.35	1.25			
	671.72		175.63	2229.50†			1,093.71†						137.75†
	154.80								2,740.92	227.60†			
		6202	150.75	215.78	6222		87.33				137		69.75
	2,250.50†		4.75	187.32			101.87	6214	881.20	97.32			125.50
			17.50	155.17			23.94		2,188.84	225.01			62.41
6326	87.54		197.32	765.53			87.21		432.16	17.87			47.50
	421.89		5.12	201.36			25.87		1,021.05	111.17			29.25
	125.07		278.91	172.01			207.31		205.27	43.72			14.80
	301.76								418.32	246.58			62.91
	87.21		654.35	1,697.17†			533.53†		1,208.16				47.12
	551.12								459.01				19.84
	64.32	6203	73.21	200.89	6223		16.29						21.00
	50.03		5.76	212.17			27.13		6,814.01	741.61†			
			207.00	378.87									
	1,688.24†				224		201.87		387.31	152.01			7.20
			87.62	39.47			71.17		964.13	225.17			19.27
	253.01		187.31	69.83			401.07		207.09	124.18			27.16
	108.71		988.23	42.91			203.08						5.23
	187.03		324.50	18.27			73.01		2,207.63	843.19†			8.42
				62.47									
	524.97†			19.08			952.20†	6318	123.78	16.42			82.39†
				43.09					32.47	5.27			
6329	489.13								64.78	29.18			96.21‡
	516.83		1,928.81	342.13†					82.40				
	276.03								49.76				
	425.06	6209	43.17	16.97									
	201.89		81.74	28.38					323.19	50.87†			
				27.19									
	1,908.96†			6.45									
			124.01	78.93†									
	6,918.12‡		3,642.32	4,739.45‡			3,328.75‡		13,792.24	4,673.83‡			

Summary	
Foundry Material	6,918.12
Woodworking "	3,328.75
Factory "	9,413.28
Raw Castings	8,642.32
Finished Parts	13,792.24
Material in Process, Dr.	42,094.71
Factory Material	x
Supplies	962.14
Man'g Expense, Dr.	962.14

FIG. 47.—Adding Machine Summary of Material Costs

Digitized by Google

and, with due regard to possible contingencies, the goods may be passed through with reasonable precision and in conformity with a predetermined plan. Deviations from schedule time may be troublesome, but will not seriously disturb the operations of the system.

"Goods" in this sense may be gaseous, liquid, or solid and the processes of such a nature that these goods may be handled in bulk or in continuous unbroken streams rather than in individual units.

Processes adapted to the operation of a clear-cut process costing plan must involve but little, if any, special work, and this special work, where more or less does exist, must be capable of being cared for by a specific order cost finding plan applied to individual orders, and this without disturbing the cost records for the major part of the product under the process plan.

It is also essential that the processes brought under a process cost finding plan be such that the material can be supplied or issued in quantities capable of predetermination or of subsequent specific demonstration, and such that all by-product, usable waste, and offal costs may be properly allocated.

The production processes which embody the foregoing requirements and in which the process plan of cost finding is employed to advantage, may be enumerated as follows:

(1) Mass products, in the preparation of which the proportion of labor to material used is fairly standard, not only through the one cost period, but in each recurring period as well, save as it may be modified by conditions of sufficient permanence to be recognized in the cost percentages, where such are employed.

Examples of this kind of production are fustian,

Digitized by Google

breakfast foods, common soap, manufactured tobacco, angle iron, binder twine, fence wire, common brick, cotton cloth, flour, sugar, commercial gas, varnish, and other similar products where the exact amount to be produced is not of necessity positively predetermined, but in which production is capable of being conducted on the continuous performance or "till-forbid" plan.

(2) Standard grades of product where each successive order has to a large extent identical or similar labor processes or operations performed on material similar as to general characteristics though of possibly differing quality, sizes, or colors. The processes employed are of such a nature that the volume of work put in process may be made up of a greater or less number of individual production orders of clearly defined qualities.

Examples of such products are agricultural implements, furniture, mixed paints, wire nails, shoes, candy, tacks, rope, knit gloves, leather gloves, dress goods, hosiery, toilet soap, carpet, harness, meat products, etc.

Departmental Accounts

Under the process plan departmental cost accounts are kept for each department as shown in Figure 9 under Group G, with the addition of an account called "Process" to the Material, Labor, and Overhead accounts of each department. In certain lines of production the first-named department (Department 1) is not necessarily an originating department; hence in such cases Department 1 will have a "process" account as well as the others. When goods come into a department, they bring with them the costs already incurred in the preceding department, or departments. This charge is not detailed, since details may always

Digitized by Google

STOCK REPORT

TO STOCK KEEPER: Date Feb. 1, 1916

Report Stock on hand of items in Nut Shed

Size or Piece No.	Name of Article	Quantity on hand	Quantity on card	Value Over		Value Short	
3/8 x 3/16	Square Mach. Nuts 25.1	9612	9608	1	05		
7/16 x 7/32	" " " 17.5	7847 1/2	7867 1/4			3	42
9/16 x 1/4	" " " 15	18210 1/4	18272			9	27
5/8 x 5/16	" " " 13	19240	19308 1/2			8	91
33/32 x 3/8	" " " 13.6	13209 3/4	13257 1/4			6	45
1 x 1/2	" " " 9.4	4581 1/2	4585 1/2				43
1 1/8 x 5/8	" " " 9.2	9619	9616 3/4		18		
1 3/8 x 3/4	" " " 9	13118 1/4	13270 1/4			13	69
2 x 1 1/4	" " " 8.8	24896	25155 1/4			18	12
2 3/16 x 1 3/8	" " " 9.1	2754 1/2	2739 1/4	1	24		
5/8 x 5/16	Hex. Mach. Nuts 18	12789	12857 1/3			12	30
3/4 x 3/8	" " " 14.6	9082 3/4	9077		72		
				3	19	72	59
						- 3	19
						69	40

Count of above Stock must be actual and is to be taken after 4 P.M. to avoid confusion with any issuances.

Stock Cards corrected by [illegible] Net ~~Short~~ $69 40

Absorbed into Variation of Weights and Measures, Exhibit 2 line 3

FIG. 48.—Stock Report

Digitized by Google

be found in the records of the preceding departments, but is made in one total under the head of "Process."

The process charges to each succeeding department are the actual costs of the labor, material, and expense incurred in the preceding departments. A curious departure from this principle of charges at cost occasionally obtains, under which profits are allotted each department and charged with the costs of succeeding departments. A typical example of such a condition of affairs obtains in certain shoe factories. The procedure in such cases will be similar to the departmental accounts, save that each department, after the first, must be treated as having earned its profit as soon as it has completed its part of the whole process of manufacture. This system lends itself readily to the preparation of detailed and accurate accounts and, speaking generally, violates no fundamental principle of accounting. It is important, however, when preparing the financial accounts at the end of each period, to review broadly the general position, with a view to guarding against partly finished goods being taken into stock at a sum in excess of actual cost, unless there is every reason for supposing that the manufacture will in due course be completed and the articles then find a ready purchaser at a normal price. If there be any doubt under either of these headings, a reserve should be made against any possible loss on the work already done in the earlier departments of manufacture.

Another departure from the principle of charges at cost is practiced very largely in the meat-cutting industries. Here, as a rough and ready means of arriving at what might be termed a general "utilitarian" cost, the market price of all kinds and grades of cuts is obtained each morning, and prices from this list are

Digitized by Google

used for all departmental transfers during that day. This is brought into each department, individually, a speculative feature over which the departmental heads have no control.

There would seem to be little to commend either of these plans. No profits are made, nor losses sustained, until goods are sold, nor can either the factory as a whole, or any department therein, be consistently considered as making a profit. The factory delivers its product at cost to the commercial department, and it is the function of this department to realize profits for the entire establishment. The province of the manufacturing department is to turn out goods of a desired quantity and quality at as low a cost as possible, and when this is done, its responsibility is at an end. The departmental cost figures cease to be cost figures when they include an element of profit.

Standard Costs

There are many advantages in expressing the departmental costs as percentages of a predetermined list price. With the list price of each product as a basis, the cost of material and labor, and the overhead expense in each of the successive production departments through which the goods in process pass may be readily expressed by what is called a "standard" cost. These standard costs are worked out in advance, are tested in actual practice, and no change is necessary until tests or the balances at the close of cost periods show variations in the cost.

For example, suppose a given production order consists of 6,000 units at the standard list price of, say, 50 cents each, giving a total for the production order

Digitized by Google

of $300.00 list. The tabulation of percentages will then, perhaps, show the cost of this particular product in the various departments as follows:

Department	Process	Material	Labor	Overhead	Total	Departmental Costs
1		$38.60	$15.80	$11.50	$ 65.90	$65.90
2	$65.90	9.20	8.60	5.95	89.65	23.75
3	89.65	7.80	17.55	12.25	127.25	37.60
4	127.25	1.60	10.80	5.85	145.50	18.25
	.....	$57.20	$52.75	$35.55	.....	$145.50

The advantage of expressing the departmental costs at standard rates lies in the ease of calculation, of recording, of comparison, and of change when necessary.

The cost standards or percentages for the various departments are obtained in the first place from the records of past cost experience and should be approximately correct. Tests are, however, made from time to time, first to demonstrate the accuracy of the estimated percentages and thereafter to show any variation of cost from the percentages or other standards as fixed. At the end of each cost period the total standard costs (Figure 22) shown by the departmental records must, of course, closely articulate with the actual costs for material issued, labor employed, and overhead expense incurred for each department.

The standards once properly fixed give a fair average of costs under normal conditions. Thereafter, as stated, tests of specific order number or lot number costs will from time to time show any variations from the average. In each particular line of production where the general plan is employed, the range of standards must be sufficiently comprehensive to embrace all ordinary variations

Digitized by Google

due to grades. As an instance, in the hog-product industry a separate class standard will be employed for fat hogs, known as "lard" hogs and for lean or "bacon" hogs, inasmuch as the "cuts" differ. Beyond this there may be further classifications by range of weights and possibly by live-stock market variations.

In such cases the compilation of costs as shown in Figure 21 will be by "cuts" instead of by departments and will necessitate another and, perhaps, reversed plan of diagram wherein standards of weights and prices per unit of measurement will predominate, resolving from the completed whole into its constituent parts. If variations are found, their cause is determined, and if they are due to conditions which permanently change such costs in any way, the percentages or standards are changed to correspond. No change is made, however, for any temporary variation, such, for instance, as in a textile industry, might result from a chance difference in texture of material necessitating a greater or less amount of labor. Such fluctuations are of no statistical value and are not reflected in the standards.

Standard costs are the mariner's compass of a business enterprise showing, as they do from month to month, the proper course of the business ship. Predetermined costs, although of immense practical value, are subject to a slight disadvantage, more theoretical than actual, which nevertheless may prejudice adherents of the old school against new methods. The drawback is that predetermined total costs do not exactly agree with actual expenses over the same period. Let it be remembered, however, that the lack of agreement is no more important than is the lack of agreement (except at two moments of the year) between siderial time and mean solar time, the lack of agreement between standard

Digitized by Google

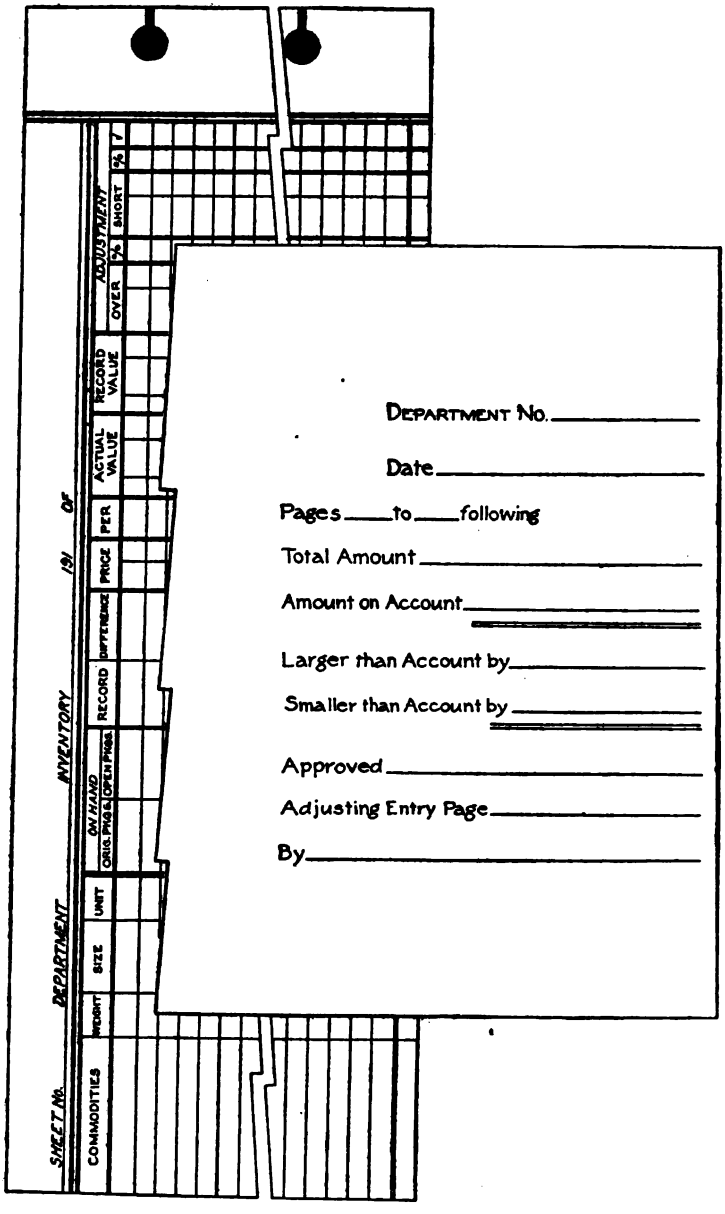


FIG. 49.—Departmental Inventory

Digitized by Google

time and the incorrectly characterized "sun time," the nonagreement between magnetic north and true north, the nonagreement of the Polar Star with the true north, or the nonexistence of any constant true north, since even the axis of the earth vacillates. Since the equation of time is always less than seventeen minutes, the difference between the true and the mean time is of little importance and brings no inconvenience into civil life. So it is with the arbitrary figures of a standard or percentage plan properly applied (Figure 49).

As a rule the standard figures approximate the actual costs so nearly that selling prices may ordinarily be based on them with entire safety. Their chief function is, however, to afford a basis of comparison by which fluctuations of cost, whether up or down, may be clearly shown, and this the figures of a standard or list-percentage plan will do. If efficiency operations are in progress which should reduce costs, the management have a standard by which any reductions attained are sharply shown. If accidental causes increase costs, the test will show this increase and the percentage expression will show its amount, and the management may then take such steps as they deem best. The cost system will indicate the conditions. It is for the management to determine what these conditions demand.

Production Registers

The Production Register as its entries are shown in Figure 20 has more particularly to do with the classes of product which require varying operations on a given machine or bench and varying lengths of time for these operations. In the case of process production these conditions do not obtain, as usually the operations

Digitized by Google

are more or less common to all the machines in a given group or section, the cost unit being based on the product of such group or section rather than on the product of any single machine.

As was discussed in Chapter IV, concerning the routine of an order, we have considered the advisability of clearly defined records of progress and costs surrounding the industrial order as a unit. Hence it is essential that no matter what be the routine of order-issuance in the particular factory, some convenient means must be provided for control. In the main Figure 20, with fitting modifications, will fill this need, the various phases of production order numbering being described as follows:

(1) *Numbers Common to All Departments.*—(a) Where the individual production number is based on a customer's order and several departments are concerned in the execution of the order one (or more if desired for classification) series of numbers will carry throughout all departments, as in the case of shoes, candy, boxes, printing, etc.; and (b) where certain lots of goods, standard either in whole or up to a certain point in the process, are put through in predetermined quantities based either on positive sales or on anticipated sales, as in furniture, soap, iron safes, hosiery, etc.

(2) *Departmental Order Numbers.*—(a) Where each successive process is based on the need of two or more production orders in succeeding departments, as in the case of combing wool, spinning yarn, dyeing, weaving, knitting, etc.; and (b) where the process is supplying the needs of specific orders and simultaneously is producing goods for stock, either as "filler" or in anticipation of future needs, as in the case of brass and small

Digitized by Google

grey iron castings, etc. It is less confusing in these cases to have such producing departments stand squarely as units of production complete within themselves.

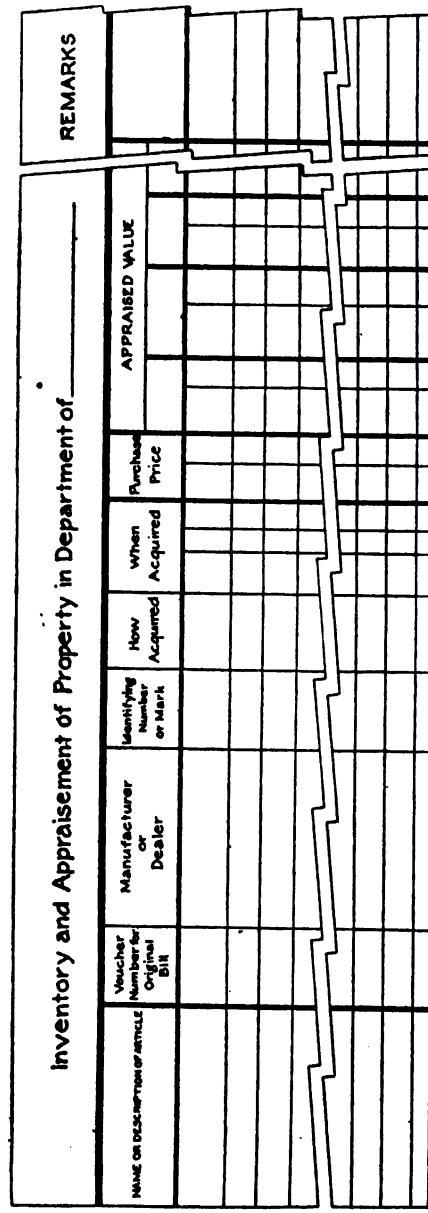
(3) *Diffusion without Numbers.*—Where the conditions are such that there can be no clearly defined line of demarcation between order numbers of groups or classes of material or goods or of the service contributed thereto, it is customary to spread the cost of such processes in some manner as an addition to overhead. This, however, departs from the principles of accurate cost finding and is not to be recommended. Such operations as nickel-plating metals, acid baths for glassware, smoking meats, etc., can be costed under the point system explained in connection with Figure 29 in Chapter XIII.

(4) *Daily Routine Orders.*—Where the production is standard and continuous, the various articles of product being turned out day after day with no written production order other than a list of quantities, based upon customers' needs, as in the case of bread and cake bakeries, artificial ice, etc., the chronological date is used. Production credit in the case of bakeries is stated in "counts" of 4 or 8 cents each, and costs are determined "per count" based upon monthly compilations.

(5) *Machine Numbers.*—Where the production is standard and continuous, the various articles of product being turned out day after day, varying in pattern or design but conforming to certain well-defined grades, as in wire nails or in automatic screw machine product.

(6) *Product List Numbers or Catalogue Figures.*—(a) Where the product is standard and of an indeterminate quantity nature, and perhaps on the "until I tell you to stop" plan, as in the case of standard agricul-

Digitized by Google



Inventory and Appraisement of Property in Department of _____

Name or Description of Article	Voucher Number for Original Bill	Manufacturer or Dealer	Identifying Number or Mark	How Acquired	When Acquired	Purchase Price	Appraised Value	Remarks

FIG. 50.—Equipment Inventory

Digitized by Google

tural implements; (b) where the product is standard and put through in given quantities for the purpose of checking up production with corresponding time reports or piecework coupons, as in the case of underwear; and (c) where the product is standard and material is used to best advantage, perhaps several orders being executed simultaneously according to the judgment of the cutter, as in the case of wagon parts. Under this plan any lumber taken from the piles is charged to the department material account and the extensions are made in the office at a rate per thousand feet, which includes the exact measurements for the finished parts and a margin for waste as determined by experiment or by the experience of preceding cost periods.

In the modification of Figure 20 to fit the needs of a process cost the method of distributing the overhead will also be considered; and again whether or not complete costs are gathered departmentally and transferred progressively from one department to another. The basis of levying the charges against order numbers must also be considered—whether the operating hours of the operator, including overhead, form the basis of the plan or inclusive costs relating to the machine or process, or tonnage (pounds) or measurement.

For a modification of Figure 20 where it is desirable to keep records of production by individual machine numbers and simultaneously to arrive at a total for the whole division or department, the "Material" column will be retained for the reception and compilation of standard costs of the material element, and the "Overhead" column for the expense element, possibly as a weekly charge. Labor will be divided broadly into two classifications:

Digitized by Google

(1) *Preparation.*—This should show the time consumed in the various necessary preparatory operations which may be common to all products passed through the machine or which may be spread over but one or more specific products, as fabrics on a yardage basis.

REPORT OF DEFECTIVE WORK—Cost Department Copy

IDENTIFICATION:
Name of Part _____ Casting No. _____
Workman No. _____ Department No. _____ Order No. _____ Foreman

CAUSE:
1. Imperfect Material
2. Imperfect Part
3. Broken
4. Blow Holes
5. Improperly cored
6. Improperly laid off
7. Spoiled in Machining
8. Bad Pattern
9. Other causes _____

Defective through cause No. _____
Fault of Department _____
Can goods be used elsewhere? _____
Where? _____

DISPOSITION OF THE GOODS:
Delivered to _____ Date _____ For what use? _____

In the Cost Department the Order Number to which Material, Labor, etc., have been charged, will be given credit as per amounts shown.

Finished Parts	Cr. $	Scrap Account	Dr. $
Material	Cr. $	Expense	Dr. $
Machine Time	Cr. $	O.&R. Damage	Dr. $
Labor	Cr. $		
Expense	Cr. $	Entered by _____	Dr. _____ Cr.

REPORT OF DEFECTIVE WORK—Superintendent's Copy

IDENTIFICATION:
Name of Part _____ Casting No. _____
Workman No. _____ Department No. _____ Order No. _____ Foreman

FULL EXPLANATION OF CAUSE:

_____
_____
_____
_____
_____
_____
_____
_____

FIG. 51.—Defective Work Report

The time required for such preparatory operations can be standardized to some extent.

(2) *Production.*—This should show the units produced each day, week, or month, and the machine time consumed in their preparation. A separate subgroup

Digitized by Google

of headings can be supplied for each of the several standard qualities which the particular division of the plant produces.

In the case of weaving and knitting, by means of a totaling line under the "item lines" allowed each machine, the total can be ascertained for each quality for each loom or spinning frame, and these totals can in turn be summed up and the progressive total be carried forward to and include the last machine in the particular division.

Production Summaries

Where machinery is involved, no matter what the general system of cost finding may be, it is essential to the management to know, not only the direct and indirect hours of labor or machines, but the product by units each day from each machine, as well as the time required to get that amount of product out, the time expended in preliminary preparation, and the time each day that the machine was idle. The machine report is one of the most valuable records of a cost finding system. It is of a "telltale" nature, indicating the pulse beat of the plant, and, properly used, constantly tending to an increased production at a decreased cost.

The importance of maintaining a definite degree of machine efficiency is readily understood when we consider that in the ordinary well-equipped plant the complement of each kind of machine is only sufficient for reasonable operating requirements, and, if any one of these falls below its proper output, machines or equipment dependent upon it for work must also fail similarly, the output of the whole plant be "held up" or diminished in proportion, and the profits fall off in a

Digitized by Google

much larger ratio. The average employee does not recognize this fact, nor, unless employees are upon a bonus-earning basis or in some other way, friendly or financially, interested in the success of the plant, would it appeal to him if he did.

Figure 23 is a form of machine record which, properly used, will show exactly how many units of product are being turned out each running hour, thereby showing whether or not the machines are being used to the best advantage. The entries on the machine record can be made from the daily time report of the operator of the machine, so prepared as to show the totals for the day's record of time. There are on the market two different types of mechanical devices for making positive records of machine production entirely independent of the operator's attention and protected against his interference. These devices are electrically operated, and the registering device usually is in the office and not at the machine; an accurate count is had of every minute that a press or linotype is shut down, also accurate registration of impressions on the presses or the lines on the linotype. They are operated on lathes, box making, moulding, textile, brick, and other kinds of machinery. Such registrations can be copied on a ruled form such as Figure 23.

Figure 24 presents a means for collating the production and the cost of individual operations, together with the net yield of finished product. Under the heading "Production" is listed the number of pounds handled in each operation, also the cost of such handling. These production figures and costs are had from the daily accumulations on the Production Register or from the card files maintained in connection with it; the costs being had from time cards, slips, coupons, or other

Digitized by Google

media through the identical or similar channels. By dividing pounds into cost, a unit cost per pound is arrived at and is entered in the first column under "Cost per Pound." The next column is to show the average cost of the three months or periods last past. These two columns have provision for recording to the fifth decimal of a dollar. By totaling these various operations a gross unit cost is had; from this is deducted wastes disposed of, giving the net material cost per pound. To the material cost is added the total labor and the total expense, the grand total being shown not in one item, but in three, segregated over the grades produced in the same ratio, as the open market is with reference to the purchase price of the same three grades.

At the right-hand side of the form is the same kind of record for spinning yarn, handled in precisely the same manner. It is from the average cost of the three periods found in this manner that the standard costs are obtained for use in connection with wool transfers from stocks to the spinning department and for yarn to stocks and out again to the fabric departments.

Figure 25 shows the means of arriving at comprehensive costs per unit in a given division or department in the weaving of various qualities of carpets and sewed rugs, such as body brussels, wool wilton, wilton, etc. The total production and the total costs having been found in the different processes by means of a Production Register and its related files, they may be collated on a form of this character. A summary can be made of all similar departments or divisions in the plant and from this summary a sheet compiled for each separate grade in order to obtain the unit cost in each separate grade.

Digitized by Google

Figure 26 presents a form to some slight extent similar in its operation to Figure 23 in that it is self-contained and does not depend upon the Production Register for its figures. Each production report issued by the dye house is listed in this form. A feature of this form is the transition from avoirdupois to yardage; in other words, the goods go into the department on a tonnage basis and are delivered from the department on a yardage basis. This state or condition exists in other lines of production as, for instance, toilet soap when it is pressed into cakes takes count instead of weight. Care must be exercised at this point that discrepancies do not creep in. This general style of form will do for any lines of product handled continuously day after day.

TIME WORK ON JOBS
TURN THIS SIDE IN
Man No._____
DEPARTMENT PAY ENDING
_____ _____
NAME _____

DAY	ON	OFF	ON	OFF	ON	OFF	HRS
MON							
TUE							
WED							
THU							
FRI							
SAT							
SUN							
MON							
TUE							
WED							
THU							
FRI							
SAT							
SUN							

RATE____HOURS_____$_____
VARIATION: OVER_____UNDER_____
TRANSFERRED TO LABOR CARD_____

FIG. 52.—Time Work on Specific Order

At the right-hand side are cost compilations and the affixing of unit costs to the various fabrics to the fourth decimal of a dollar.

Figures 27 and 28 represent four sections of a large form for arriving at the cost per ton of pig iron. In Figure 27 the upper portion shows (excepting for the foreshortened portion) the days of the month from the

Digitized by Google

first to the thirty-first. These same dates are presumed to carry all the way across the left and right upper portion of Figure 28. Any amounts or values inserted in Figure 27 (the left side) represent costs and any in Figure 28 (the right side) represent the yield or production.

In this form (the assembled four quarters or completed whole) is entered each day the total of each ingredient going into the "charge," and on the same date line is shown the weight in tons of the various grades of pig iron produced. At the end of the month totals are drawn for each column upon a total line prepared for the purpose. From these totals losses are deducted and percentages determined.

In the bottom portion (including left and right sides) recapitulations are prepared for costs and production respectively.

Digitized by Google

CHAPTER XIII

CONVERGENT METHODS

Definition

In different lines of production accountants and system exponents have, from time to time, evolved plans embodying effective combinations of general accounting principles and have coined certain names therefor which have come into greater or less use as "systems" which, to the layman, might seem to stand out clearly from the basic plans. In the main, however, these systems do not in any way depart from nor transcend the principles involved in the specific order plan or the process plan, but are merely the concentration or convergence of certain predominating points in each plan, formulated into a well-defined method of handling details along lines of least resistance or most effectiveness. In the main the records surrounding the use of the elements, material, labor, and overhead are nearly, if not precisely, the same as in the basic plans.

Different conditions exist in every different line of production (Figure 31 and Chapter XIV) and must be studied before a system of accounting can be devised. A superficial view of conditions may indicate one plan, while a study of all conditions, including the "exceptions" in the various departments, may develop the fact that another plan will fit in very much better. As a rule any plan must be adjusted and modified to overcome

Digitized by Google

the various difficulties that inevitably arise before an effective and satisfactory working system is attained.

Machine-Hour and Sold-Hour Plans

The machine hour may be described as the distribution of manufacturing costs "through the machine" and is applicable to mechanisms such as looms, printing presses, annealing furnaces, cranes, and practically all sorts and kinds of machine tools.

Under the machine-hour plan rent, light, heat, power, and the hundred and one other items that go to make up the usual overhead expense, become, for the most part, direct expense charged in proportion to each machine, or group of machines, the total affording a basis for a proper machine-hour charge. This charge is "loaded" on the product of the machine, or group of machines, according to the number of hours such product monopolizes the services of such machine or any one or more of the group of machines. In other words, the expense applicable to a machine product is charged to it by means of an hourly rate for the use of the machine.

The machine-hour plan of cost finding has a wide range, but before its adoption in any particular case a careful study of conditions should be made. Where properly applicable the machine-hour plan is undoubtedly the most accurate, and, once installed, the simplest method of cost finding. The difficulty lies mainly in its first installation—in the determination of the exact proportion of the various expenses which may be fairly charged to each particular machine or group of machines composing a unit.

The sold-hour plan is a method of applying manufacturing costs to product on the basis of hours of labor

Digitized by Google

involved. It is somewhat analogous in principle to the machine-hour plan, but differs in the method of application, inasmuch as under the machine-hour plan the operator is considered as incidental or auxiliary to the operation of machines, and under the sold-hour plan any

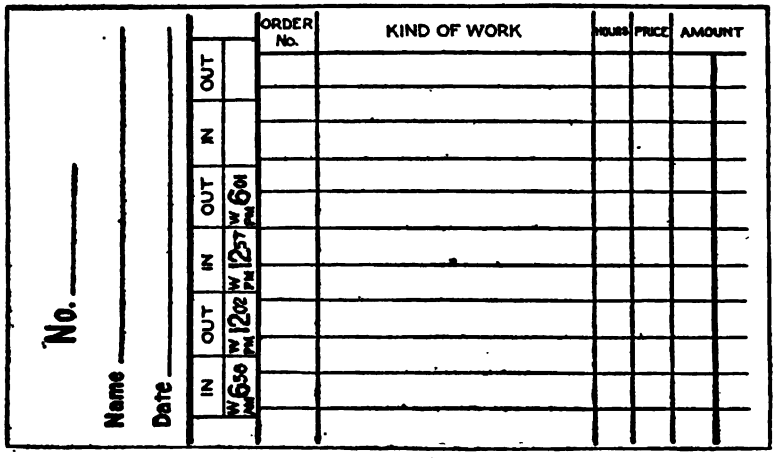


FIG. 53.—In and Out Card. Report of Work Done

mechanical aids are considered as incidental or auxiliary to the work of the operator. In other words, under the machine-hour plan costs are applied to product "through the machine," while under the sold-hour plan they are applied "through the machinist" or otherwise through productive labor.

The results secured under either method are, of course, practically identical, i. e., the detailed cost of product; and under both methods costs are charged on a time basis, but in the machine-hour plan this time is the used or "sold" machine hours, and in the sold-hour plan it is the used or "sold" labor hours.

Another distinction must be made between the machine-hour plan and the sold-hour plan. Under the

Digitized by Google

machine-hour plan, costs are charged through each individual machine, or through groups of machines called "production centers." Under the sold-hour plan, charges are not made through the individual operator, but are made through the productive labor of the department as a whole. In the one case the costs on a particular job are determined by the number of hours it occupies the operations of particular machines, the cost varying with the machine. Under the sold-hour plan it is determined by the number of productive hours devoted to it without regard to the individual by whom such service is rendered.

In choosing between the two plans, when either may be used, the proportion between expense and labor in the cost of the particular product has an all-important bearing. When, as is usually the case in machine work, the expense involved exceeds the labor cost, it is better to base the calculation on machine time; but if the expense involved is less than the labor cost, it is better to take labor as the basis of calculation.

The sold-hour plan necessarily requires a record of the time devoted to every order, and there is no means of combining or grouping orders to save clerical labor unless costs are wanted only in one group as a unit.

The sold-hour plan is used to advantage in plants which are devoted largely, if not entirely, to special work or "order" work of such nature that practically all the operations in each department may be performed by all employees in that department, and in which the assignment of successive orders as they come in is governed more by the conditions of work on preceding orders than by the peculiar skill or other qualifications of particular employees. Thus, for instance, in a machine shop

Digitized by Google

devoted to experimental work, perhaps any one of the machinists employed is capable of undertaking any work coming into the shop, and a waiting job is assigned to the first man who is at liberty to take it up. The same condition obtains in a printing office, where as a rule work coming into the composing room is assigned to the first available compositor without regard to his qualifications, or coming into the pressroom is put upon the first idle press capable of performing the work without regard to the skill of the pressman in attendance.

Date	
START	STOP
MON. A.M. 10 30	MON. A.M. 11 31
Time	
Rate	
Cost	
Acct. No.	
Office Order No.	
Shop Order No.	
Operation	
Fin.	Unfin.
Name	
No.	

FIG. 54.—Start and Stop Card. One Job

Where work is of this nature, there is usually a fairly well-averaged rate of wages—a condition necessary for the proper working of the sold-hour plan. Where wide variations from average exist, the plan is not to be recommended. Thus in a plant devoted to standard work, each operation is usually given out to employees who are specially trained or fitted for that particular operation and who can, therefore, accomplish much more in a given length of time than could other employees in the same department. As the skill of these operatives and the importance of their work vary greatly, there is a correspondingly wide divergence in their wages, effectually preventing the economical use of the sold-hour plan.

Digitized by Google

It is true that these same conditions of peculiar training or skill obtain in special work to a limited extent, but usually wage divergencies in such work are not sufficient to prevent the fairly accurate operation of the sold-hour plan. Occasionally some particular job may come in requiring the attention and, therefore the employment, of a specially trained operative, who may be paid a higher wage than his fellows. To counterbalance this some few lower-waged operatives or apprentices are almost always found in such establishments, the general result being a fairly well-averaged wage rate.

The Point Method

When a workman takes lumber or other material and cuts out of it parts of possibly four or five units of product with resulting scrap from which parts for other products can be evolved, the proper distribution of labor costs and the material costs likewise is a problem. Where such conditions exist, the point method may be used to advantage.

Under this method a shop order is used covering whatever pieces the cutter is likely to get out of his material in a specified time. A week is a convenient period, the week-end ordinarily presenting a good cleaning-up time. For the first two or three days after the plan is instituted, the cutter keeps "tab" on the average length of time devoted to each part of his product, and a record of his time is made by "points" so as to establish a comparative scale whereby the labor costs may be equitably distributed.

The time required to produce the largest piece of product or the one consuming the greatest amount of

Digitized by Google

labor is set at ten points. The next piece by comparison of average time consumed may, perhaps, be properly fixed in the scale at eight points and so on down the line to the piece consuming the smallest amount of labor.

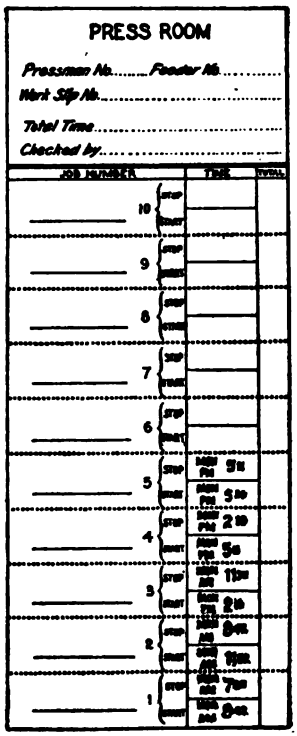


FIG. 55.—Start and Stop Card. Ten Jobs

A count is necessary in order to ascertain the total product for the period. This may be an actual physical count, or the product may be ascertained by measurement in the case of wood or by weight in the case of metal.

Assuming that we have under consideration wood parts and that the week's product includes 56 parts of ten-point product, with a total of 560 points; 183 parts eight-point product, with a total of 1,464 points; 79 parts of seven points, with a total of 552 points; and 127 parts of two points, aggregating 254 points, we have a grand total for the week of 2,831 points.

The labor cost having been, say, $18.00 for the week of fifty-four hours, the value of one point is easily ascertained to be $.064 and the time consumed per point to be 1.144 minutes; the former is to be used as a basis of labor costs by extending the points on each part to secure the labor cost of such part; and the latter is to be used as the basis of expense, or overhead, under any of the plans of expense distribution which use labor time as a basis of diffusion.

Digitized by Google

The material can be apportioned in like manner either on a basis of "size" points, or by the exact measurements of each part plus a percentage loading to cover waste on actual results, this percentage being obtained by tests each month.

If stock is removed before the end of the week when this method of costing is practiced, it should be removed by known quantities so that the record may not be lost. In the case of parts made of wood, sheet or bar iron, or steel, this can be accomplished by trucks with sides marked or scaled in such manner as to indicate quantities by the height reached on the scale.

The point system is applicable wherever a number of parts are cut out or otherwise treated at the same time, as also in any operation where several parts which cannot be kept separate are worked on by one workman, or again where the workman cuts material into any one of a dozen different patterns according as the material may cut to advantage. Under any of these circumstances the point system not only gives a good basis for the application of costs, but also serves admirably to check up the work of the operative. It gives a positive record of the goods produced from a given amount of raw material and establishes comparative figures by which the efficiency of the workmen may be readily judged.

The application of this plan to nickel-plating or to acid baths of any nature varies slightly in details. In the preliminary preparation for an installation in the acid department of a glass-cutting plant, the value per pound of the acid mixture is first determined and a table prepared of values based thereon from 1 to 100 pounds for use as a ready reference.

Digitized by Google

The number of pounds of acid used each day, as per the daily report of material drawn from stores, is taken, and, by application to the chart of acid costs, this quantity is reduced to a money value. The money value is then divided by the total number of production points for the same day, and thereby is determined the "acid cost" per point for that day. To this is added the labor cost and the expense or overhead for the acid department, and the cost per unit will thus become known for the day.

Each article put in work is "rated" at its proper number of points by a person of experience in the acid process who is capable of judging the "point class" such an article belongs in. A classified list is then made after the following form:

POINT CLASSES

2 points	*5 points*	*7 points*
Butterettes	Goblets	Compotes
Pin Trays	Bonbons	Nevo Compote
	Mayonnaise bowls	710-7 Vase
3 points	Mayonnaise plates	7″ Nappies
Wines	5″ Nappies	8″ Feet
Sherries	6″ Nappies	9″ "
Cordials		
Clarets	*6 points*	*9 points*
Tumblers	Colognes	Ice Tubs
Footed Sherberts	Oils	8″ Nappies
Handled Sherberts	153-6 Vase	No. 1 Fern Dishes
	153-8 "	9″ Nappies

When tests are made from time to time and it develops that certain articles are rated too high or too low, then such rate is changed.

As work passes through the acid department, the number of pieces involved in each individual order is multi-

Digitized by Google

plied by the rate per piece, thereby arriving at a total number of "points" on each job. These totals are accumulated each day so that a grand total is had for all jobs for the day, the result being the total of the day's production expressed in points. These daily accumulations are shown on a peak sheet (Figure 29), which is used as a means of determining whether jobs are properly "rated" or not.

Labor and burden costs per point are based on production, expressed in points, by 100-point increases at a cost of $8.07 per day, this being the twenty-fourth part of one month's cost in the acid room, whence this record comes. At this rate 1,000 points cost $.00807 per point. When a basis is arrived at after this manner, a table is prepared after the manner here shown, wherein it may be seen that increase in quantity means decrease in labor and burden cost per point.

1000	.00807	1900	.00403	2800	.00282
1100	.00734	2000	.00384	2900	.00269
1200	.00672	2100	.00366	3000	.09257
1300	.00621	2200	.00351	3100	.00252
1400	.00576	2300	.00336	3200	.00244
1500	.00504	2400	.00323	3300	.00237
1600	.00474	2500	.00310	3400	.00232
1700	.00450	2600	.00299	3500	.00229
1800	.00425	2700	.00288	3600	.00224

In Figure 29 there are three separate lines used for "peak and valley" delineations. The first column represents the weight of the predominating acid, the second column the cost per unit, and the third the production expressed in points.

In practice colors are used for the lines as a ready aid in following the lines; in the present figure, however, in place of green, red, and black for the succes-

Digitized by Google

sive columns the following are employed: (1) dotted lines for acid, (2) plain black lines for cost per unit, and (3) dash-and-dot lines for production expressed in points.

At the right-hand side of the figures may be seen the date column, two columns representing the pounds of the two acids delivered in carboys to acid room and used (of which, being mixed in the vats in proper proportion, but one need be considered as a basis of measurement), a column showing daily records of points processed, and last, a column showing the cost per day. These figures can be compared with the daily registration of dots on the chart. It may be noticed that on days of high production, like the fourteenth day, the acid cost is also comparatively high, whereas the unit cost goes low. Conversely, as on the nineteenth day when the production was low, the unit cost was high.

There is usually a reason for these conditions; possibly a small volume in readiness for the process or, on the other hand, a spurt of energy resulting from a desire to get out certain goods by a certain time and perhaps a longer length of time spent at the process than usual in a given day. In any event the facts are so pictured that whatever conclusion desired may be drawn.

In applying these costs the monthly averages are usually employed as embodying all the variations incident to the process.

The Sheet System

Under this system a schedule or sheet is started each day with orders listed thereon sufficient, if possible, to utilize in full the capacity of the various departments through which it must pass. The dates on which such a

Digitized by Google

schedule must leave the various departments are all determined in advance. Thus in the manufacture of shoes specific orders are put into process with a "tag" to accompany each case. This tag constitutes the production order, and bears the relevant data concerning production details, and follows the goods from start to finish, serving in this way as a job follower. These tags are carefully studied and arranged into daily groups (which are entered on sheets) moving through the factory on a prearranged schedule, so that there will be no localized congestion nor interference between the various specific orders, while at the same time the full capacity of the plant is utilized.

Shoes are required to remain on lasts for a certain length of time, and in order to make a minimum number of lasts give the maximum service the lasts must be kept constantly employed. This then, is the "neck of the bottle" in planning the proper combination of shoe "tags" for a given "sheet," inasmuch as goods cannot pass through subsequent processes any faster than the lasting process permits. To keep the investment in lasts as low as possible, they must be kept constantly in use by careful planning rather than have congestion seem to make necessary the purchase of additional lasts for shapes which quickly become obsolete. To do this necessitates an "in and out" schedule for each size and shape of last, and these schedules are carefully studied that there may be no gaps nor overlaps in planning their use.

Where it is the custom to take orders for future delivery, there invariably are customers who let the salesman pass by orderless on his first visit and frequently on a subsequent visit give him a special rush order. Where manufacturers accept these rush orders indiscriminately and put them in process under special stress, the factory

Digitized by Google

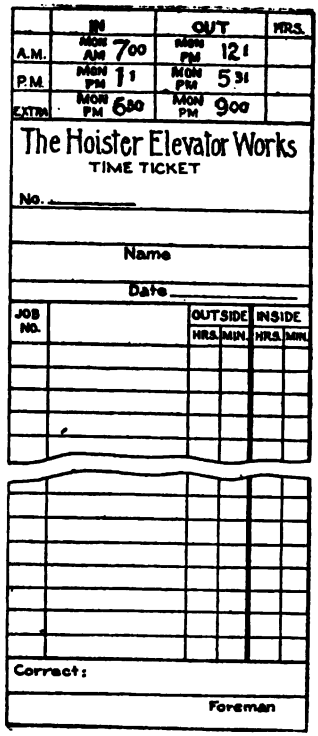


FIG. 56.—Start and Stop Card. Written Description

ceases to be a "manufacturing" proposition and becomes a "job shop," as all routines are thereby upset. Certainly any well-laid plans for a sheet system would be upset. There are always instances where certain customers' needs and desires must be met, no matter how unjust or unfair be the demands; hence provision is usually made for a certain amount of rush work. If each salesman is given the privilege of a limited number of "cases" each week, he can make his own choice as between his customers as to which shall be specially favored. These chosen orders are then "tagged" and put on the single "rush order sheet" for the week, and this sheet is given precedence over any other tags that are awaiting their regular turn.

Block System

This plan is to some extent similar to the sheet system in that certain groups of orders are put through the processes of the factory "on time." This plan gets its name from its similarity to railroad dispatching; the work is started one "block" or group at a time, and in the factory processes a given "block" must be cleared up before any work is started on a succeeding "block,"

Digitized by Google

just as a railroad train under the block system is not allowed to enter the "block" ahead until the "clear" signal is displayed.

The present plan is used in a knitting mill; consider for example the making of knit gloves. As a preliminary to production the various customers' orders are carefully scrutinized, and compilations and totals are made of each style, size, and color. From the quantity totals thus arrived at production orders are made. Each production order representing a certain style, size, and color is given a strip of coupons numbered perhaps from 1 to 15. These coupon numbers are opposite the word "bag," as they are subsequently each to represent a certain bag, which use will be explained. The production number is, by a rubber stamp, affixed to each coupon of the strip.

A given number of production orders, for example twenty-five, are chosen according to the certain knitting machines about to be available. These numbers are listed on a "block" sheet (Figure 30). Based on this sheet an order is sent to the yarn departments for whatever yarn is needed. This in due course is supplied, and the various knitting machines take up the work as rapidly as preceding orders permit. In the process the knitting machine constitutes the "neck of the bottle" in that no subsequent work can be done before the fabric is knitted.

At the end of each day or, if desired, upon the completion of a predetermined number of yards, the knitter places his production in a muslin or canvas bag, which in turn is sent to the cutting department.

Accompanying each "block" is for each production number the strip of coupons, showing bag numbers as previously mentioned, and also one strip of coupons bear-

Digitized by Google

ing "bag number 1" and the consecutive operation numbers that are to be performed in the making of the gloves. The separate coupons show the operations in the order of their precedence (see page 294); also they each have space provided for a number of dozens and pairs finished together with date and piecework rate. The last or final coupon shows the grading of the finished goods between "perfects" and "seconds" with dozens and pairs of each.

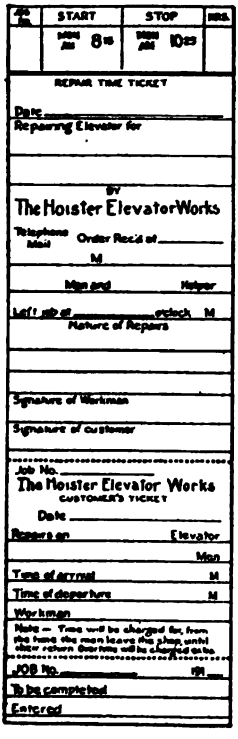

START
STOP
REPAIR TIME TICKET
Date
Repairing Elevator for
BY
The Hoister Elevator Works
Telephone Mail
Order Rec'd at
M
Man and
Helper
Left job at
o'clock M
Nature of Repairs
Signature of Workman
Signature of customer
Job No.
The Hoister Elevator Works
CUSTOMER'S TICKET
Date
Repairs on
Elevator
Man
Time of arrival
M
Time of departure
M
Workman
Note — Time will be charged for, from the time the man leave the shop, until their return. Overtime will be charged extra.
JOB No.
To be completed
Entered

FIG. 57.—Start and Stop Card. Outside Repair Job

As the knitting department sends the first bag to the cutting department, the operation strip is inclosed therein; then the clerk detaches the coupon numbered "1" of the "bag number strip" and sends it to the production manager's office as an indication that "bag number 1" is on its way. Upon receipt of this coupon in the ordinary course of events, a second operation strip is sent for inclosure with the second bag, the coupons all bearing "bag number 2," and in like manner all subsequent bag number coupons received by the production department, excepting the final, are the signal for sending the next operation strip. When the final bag is sent to the cutting department, all the remaining unused coupons are returned by the knitting department for voidance or destruction and also as a signal that the knitting is completed on that particular order.

Digitized by Google

The production department office retains several carbon copies of these "block" sheets, one for each department, and as bag number coupons and subsequent operation coupons are received in the production department office, they are listed on the proper departmental sheet under the proper bag number column. In this way progress on each individual "block" in each separate department can be carefully traced.

Where production on any production order is held back for any good and sufficient reason, the individual production order is transferred to a "hold-over block sheet" so that the main portion of the work in the "block" may be brought to a fitting culmination.

The subsequent operation coupons are used for piece-work compilations, and it is for this reason largely that not more than enough for the operations on the contents of one bag are given out at one time. There would be the possibility of confusion through overestimating the exact number of bags that were to be involved; also there would be the possibility of misusing coupons with dishonest intent.

The Budget System

Broadly, a "budget" may be defined as a statement of financial estimates. At the present time the so-called "budget" system is used extensively in the steel fabricating industries. A company's estimators figure on jobs, and on a fair average are awarded perhaps one out of four. It is sometimes a subject of debate in the inner councils of the business whether or not it pays to go quite so deeply into detail as is necessary under the budget plan, and yet on the other hand, under the old guesswork plan if money was lost on a contract, it was

Digitized by Google

never known where or how the loss occurred. Under the budget system the cost data are filed and are readily accessible, and when bids are requested on similar projects, these data can be closely scrutinized as a basis for matching past performances with past and present estimates.

Material, save for market fluctuations, is fairly stable when plan is compared with performance; labor is usually the element of greatest fluctuation, and this carries with it, on a time basis, the element of expense or overhead.

Upon the awarding of a contract it is assigned a number. A perforated strip of forms is employed embodying the following:

(1) *Acknowledgment to Salesman.*—This shows job number, customer's name and address, date of contract, date to be shipped, etc., together with commission on the order, on all orders this month, this year, volume commission, etc.

(2) *Notice of Work Order Issued.*—This portion is for the general manager and shows job number, customer's name and address, salesman's name and commission, and also the various dates. In addition to this it shows a summary of the estimated cost as follows:

Labor	$	.....
Labor overhead		.....
Material		.....
Material overhead @....%		.....
Total shop cost	$	.....
Administration and sales overhead @....%	$	.....
Total cost F. O. B	$	.....
Erection	$	.....
Erection Overhead @....%		.....

Digitized by Google

Field Test	.....
Permit Bond	.....
Cartage	.....
Railroad fare	.....
Board	.....
Freight	.....
Commissions	.....
Total Cost	$ .....
Sold for	.....
Profit	$ .....

At one side is an annotation: "At the close of the contract you will receive a detailed comparison of estimated and actual costs on a sheet of a suitable size for filing with this notice."

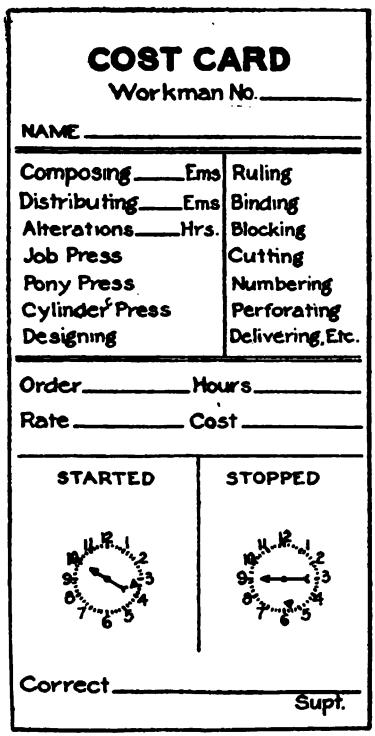

COST CARD
Workman No.
NAME
Composing ___ Ems
Distributing ___ Ems
Alterations ___ Hrs.
Job Press
Pony Press
Cylinder Press
Designing
Ruling
Binding
Blocking
Cutting
Numbering
Perforating
Delivering, Etc.
Order ___ Hours ___
Rate ___ Cost ___
STARTED
STOPPED
Correct ___
Supt.

FIG. 58.—Time Stamp Card. One Job

(3) *Cost Comparison Sheet.*—A tabulation having each separate shop department shown.

(4) *Work Order.*—This shows job number, date of contract, date received at factory, date reserved, date issued to shop, and date wanted, customer's name and address, shipping directions, terms, delivery, routing, drawing numbers, etc., and space for a terse description. This is punched for a prong binder.

In the cost department a

Digitized by Google

sheet is opened with the contract number; this shows the name of the customer, the building or project, the architect, etc., also on the right-hand side in the financial record section the date and contract price. As payments on account become due under the agreement and are paid by the customer, they are entered in this form under a "Cash and Sundry Credits" column.

On the left-hand section of the sheet are groups of departmental columns, each department having a column for labor, material, and supplies and in some cases other items. In this section are kept the totals as they are taken from the cost sheets either daily or weekly as preferred.

The daily cost sheet consists of a considerable number of columns across a large page. This sheet is progressive during the month, as many lines across the sheet being given to each date as needed. At the top of each column is shown the designation of the item which the column represents, and next is shown the budget allowance for this item, together with any extras that may have been provided for.

Daily time reports of individual workmen are posted to the daily cost sheet item by item separately. The date on any one line carries all across the page. The lowest line on which appears the last entry of any one item is chosen for the end of that particular date. When a sheet is filled, all columns are footed and pencil footings shown on the bottom line; these pencil footings are then cross-footed and compared with the total of the (daily or weekly) footing column as a proof of accuracy.

As cost figures accumulate, comparison is made with the budget amount (at head of column) of each indi-

Digitized by Google

vidual item, and in some cases special investigations are made as to why costs are so high.

In some plants a "superintendent's cost sheet" is maintained. This is a large sheet somewhat after the general style of Figure 83 (Expense Analysis), with item numbers across the top after the manner in which Figure 83 shows "From" and "Amount." The lateral zones across the sheet show the various departments. In these little recording spaces are posted the workman's daily time reports, and when this is kept, then daily totals are taken from it to the daily cost sheet.

Under the budget system it does not necessarily mean that the cost must not exceed the estimated amount, as the work must be produced under the contract, no matter what be the cost. It is a sharp and succinct method of watching the possible variations between plan and performance.

Digitized by Google

PART THREE—INDUSTRIAL CLASSIFICATION

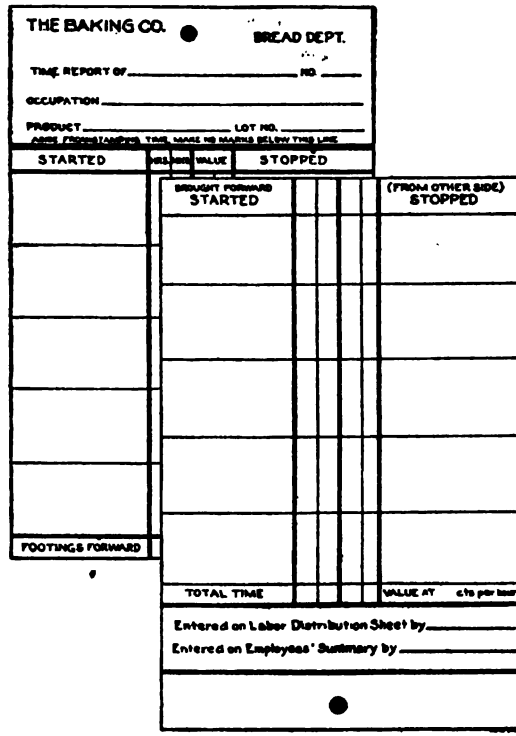
CHAPTER XIV

TYPES OF PRODUCTION

Classes of Production Industries

Factory production may be divided into two broad classifications of kinds of manufacturing:

1. Continuous. 2. Assembling.


THE BAKING CO. BREAD DEPT.

TIME REPORT OF _____ NO. _____

OCCUPATION _____

PRODUCT _____ LOT NO. _____

CODE FROM STAMPED TIME. MAKE NO MARKS BELOW THIS LINE

STARTED	HOURS	VALUE	STOPPED
FOOTINGS FORWARD			

BROUGHT FORWARD STARTED						(FROM OTHER SIDE) STOPPED
TOTAL TIME						VALUE AT ¢ to per hour

Entered on Labor Distribution Sheet by _____

Entered on Employees' Summary by _____

Fig. 59.—Time Stamp Card. Ten Jobs (Front and Back)

Digitized by Google

These with their various subclassifications are shown in chart form in Figure 31, giving two typical industrial examples under each lettered class or group. The letters used have no significance other than for purposes of ready reference.

There may be combinations of the various classes or groups present in individual plants, necessitating careful discrimination and reflection before urging the adoption of any given plan of records. As often told by "mechanical aid" salesmen, we are familiar with the prospective buyer's argument that "our business is different"; to a very large extent it probably *is* different. Can we readily believe that the economic life of an immense commercial country can be narrowed down to any all-embracing formula? Are there no differences?

Any efficient accounting system should be an orderly and logical arrangement, by simple processes, of the facts and figures of a business, in order that it may concentrate into clear and concise statements a complete expression of the activities and condition of that business. If mechanical contrivances after careful consideration of all phases involved can be made to fit gracefully into the needs of a well-devised plan, they are aids; otherwise, they are nuisances.

A continuous industry is one in which the raw material is practically all put in work at one place and the operations required to change that raw material into finished product are performed in a continuous or consecutive manner on the entire mass of material. The raw material singly or in combination goes into one end of the plant and passes through various machines and processes without dependence at any point upon the concurrence of other material or parts to be joined to it. Upon the

Digitized by Google

completion of such production the finished product is ready for the market and is not dependent upon other sections or parts required to make it a perfect whole.

Continuous production is divided into two classes:

1. Synthetic.
2. Analytic.

An assembling industry is one in which the finished product is made by first producing the various parts or ingredients and then assembling the parts into the complete whole. This type of production uses the three

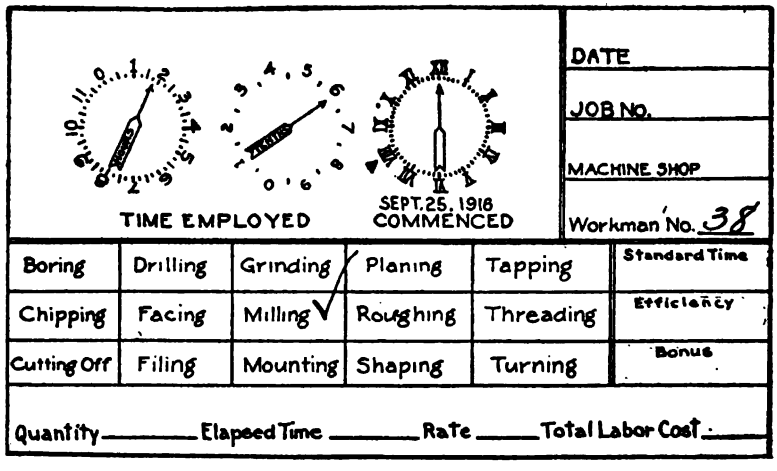


FIG. 60.—Elapsed Time Impression. Machine Shop

physical elements in fairly even proportion; there is required a manufacturing department involving material, labor, and expense to make parts, and another set of producers to join these parts.

Assembling Production is divided into two classes:

1. Antecedent preparation.
2. Reciprocal preparation.

Digitized by Google

Synthetic Manufacturing

"Synthesis" may be defined as composition, or the putting of two or more things together, as in baking bread. In our daily life we consume things which have passed through synthetical processes. A bowl of soup and a pie are results of synthesis, as are also underwear, daily newspapers, and telephone service.

A further subdivision of synthetic industries may be made between those which have resultant by-products and those which have not.

By-product group (a)

The most important industry of the by-product type is the iron and steel group. It affords from its importance and natural characteristics the best example of the continuous synthetic industry of the by-product type.

Three main ingredients enter into the production of pig iron: iron ore, coke, and limestone. Figures 27 and 28 present the left and right portions of a monthly summary for a blast furnace, showing the details by days as to both the cost and the yield.

In years gone by nearly all coke was prepared in the vicinity of the coal mines, and no by-product resulted (coke as such then was in Class D). In the present-day march of progress, however, the gases which formerly served to make useless flames are now carefully husbanded and burnt where they can be turned to good account. Coke is now quite generally made in by-product ovens at the steel plant.

Coal can be made to produce three valuable by-products aside from coke, namely, gas, ammonia, and tar. Hence in connection with a steel plant, the coking depart-

Digitized by Google

ment has apparatus to purify gas, collect tar, and treat ammonia.

Limestone is the basis of slag, which comes from the blast furnace and which yields some further by-product. Slag at one time was a source of expense to dispose of, but it is now made into cement and fertilizer.

NON-BY-PRODUCT GROUP (B)

The textile industries are the most important class of the non-by-product group, if we consider volume of production and contribution to the wealth of the country. In addition the tobacco, clay, paper, and printing industries are immensely important.

Into the textile plant is brought raw material that is worked upon during the entire time of manufacturing. Any single textile industry may be regarded as a unit industry in the sense that the entire plant is devoted to the production of one thing only—the working-up of certain fibres. This does not mean, however, that there is no wasting of the raw material as it passes through the various manufacturing steps. In every textile plant the cleaning and the handling of the material cause some material loss in every machine.

Figure 24 shows a list of steps through which wool passes to be made into its different finished products. While the material is passing through the various machines, waste occurs at every stage. In the combing process these are classified as noils, comb waste, card waste, picker waste, and burr waste. In the spinning process there is hard waste, soft waste, fly, and sweepings.

Waste spinning is an industry by itself and requires

Digitized by Google

as much skill in all its branches as does the manufacturing of a higher grade of goods.

In production which is done largely by power machinery the grading of the product or the margin of profit depends to a large extent upon the character and upkeep of the machinery, which involves the expense element. Hence we may consider the production of ordinary commercial textiles (as distinguished from hand work) as being dependent most largely upon the expense or equipment element for classifying.

Another example of the non-by-product synthetic type is cut glass, which differs from textiles in production characteristics. In this industry the glass "blank" is more or less standard in quality, and the grading of the product is entirely based upon the ability of the individual "rougher" and "smoother." Glass cutting as such is classed as synthetic merely from the fact that the "blank" is synthetic production.

Analytic Manufacturing

"Analysis" may be defined in this connection as the separation by arts (in distinction to what is produced by nature) of a compound body into its constituent parts. Analytic manufacturing separates a raw material into its commercial constituents, selecting and assorting them into primary and secondary products and waste.

By-product and non-by-product classifications are present in analytic just as in synthetic manufacturing.

To a considerable extent the by-product of the synthetic group may be the result of preliminary preparation or accessory before the objective production, while in the analytic group it is produced during the course

Digitized by Google

of objective production. In the former case it may, in a strict sense, be considered a combination of two or more distinct classes of production.

BY-PRODUCT CLASS (c)

The most important by-product industry of the analytic type is meat packing.

In Figure 5 under "assistant superintendent" may be seen the main production departments in the hog-prod-

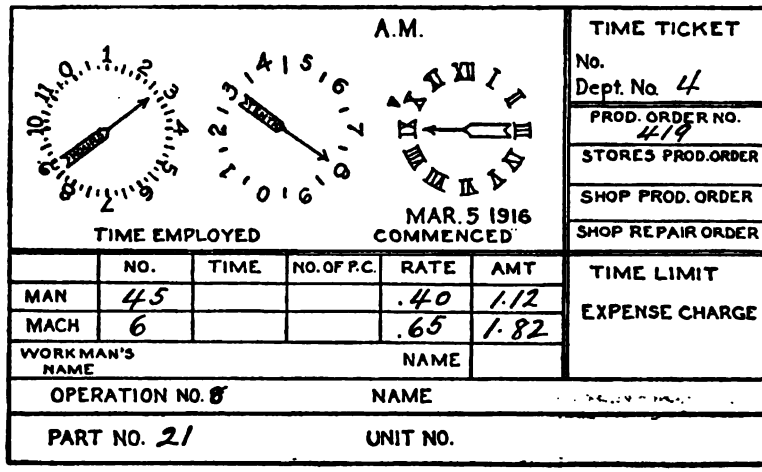


FIG. 61.—Elapsed Time Impression. Machine and Operator

uct industry, exclusive of slaughtering. It is a not uncommon practice for packers to have the first steps in the process (slaughtering) performed by a separate organization whose sole compensation for dressing the carcass is the offal. This in itself presents sufficient material for an extensive business in bone novelties, bristles, sausage casings, glue, fertilizers, and other derivative lines.

Digitized by Google

A distillery may be considered in the by-product class when it maintains a cattle-feeding department.

NON-BY-PRODUCT CLASS (D)

The lumber industry is an excellent illustration of the non-by-product analytic type. Flour, sugar, and similar forms of food products, also liquors and beverages, belong in this class; they are in the main extractive industries, the grades of the production depending entirely upon the grades of the raw material processed.

Another example of the non-by-product type is the cutting of precious and semiprecious stones. In this production, like that of glass cutting, the skill of the individual operator must, of necessity, be of a high order to produce a high-class product; hence we may consider that the grading of this product is based largely on the labor grading involved.

Glassware is classed as synthetic, while the cutting of precious stones is analytic in that it is a reductionary process on material originally produced by nature.

Antecedent Assembling Preparation

"Antecedent" is defined as that which goes before in point of time. In this class of production vast amounts of money are invested in patterns, moulds, forms, dies, jigs, templates, and other auxiliary supplies for producing constituent parts of a product in the assembling class.

To this class is properly applicable the term "manufacturing" as contra distinguished from building, fabricating, constructing, or making, in the sense of processing, individual jobs in clearly defined quantities.

Digitized by Google

"Manufacturing," in the sense here used, means the production in whole or in part of a standardized article in large or more or less indeterminate quantities to fill the requirements of the selling department's estimate of probable output. Phonographs, sewing machines, typewriters, time recorders, etc., are typical of this class.

The cataloging by individual concerns of different sizes of a given product in this class makes possible the production of certain common or typical parts in much larger quantities at one time than those parts which are wholly unique. Incidentally when these typical parts offer "good jobs" at piecework prices favorable to the workman, it is not unusual in loosely organized plants for superintendents who show partiality or "play favorites" or indiscretely dole out "filler" work, to accumulate many more pieces than current production demands. When production plants are under efficiency or financial investigation, this is one of the points carefully considered, and it is not unusual to find in individual cases more parts than will be consumed in ten or more years of normal production.

One characteristic of the assembling industries of both classes is that the goods they produce are made up of a great number of parts, each one of which must be separately handled and treated and adjusted to all the other parts of the completed article.

The products of assembling industries are in themselves objects more or less complicated in their construction and essentially specialized in their nature. They have a great amount of individuality. They are complex and various in construction. In many cases it would be unprofitable in the first place to make machines do much of the work, because the machines

Digitized by Google

would have to be altered at frequent intervals on account of the change in styles and of the improvements which are constantly being made in the construction of these direct consumption goods. In the second place, machines to do the work would have to be so complicated that long periods of time would be required to evolve and develop a profitable machine.

Along certain lines assembling industry plants have a larger number of operatives to an establishment of a given size than does any other group of plants, due to the fact that a very large amount of the work must be done by human labor to give immediate personal satisfaction to the consumer.

These characteristics offer a line of cleavage for the further division of the antecedent preparation class of production into fairly well-defined types.

1. Human phase.
2. Mechanical phase.

HUMAN PHASE (E)

An instrument like a piano is made up of several hundred pieces which must be carefully adjusted to each other to evolve the perfect instrument. The individual pieces are themselves made up of parts, some of which in many cases are subject in a greater or less degree to atmospheric conditions. In order to get beauty in workmanship and a trustworthy article, all these parts must be handled with discriminating care and deftness. Machinery can cut the lumber, twist the strings, smooth the ivory, make the felt, plane the pieces, but it cannot assemble them without intelligent guidance. This product clearly exemplifies the human phase of assembling.

Digitized by Google

MECHANICAL PHASE (F)

An instrument like a dollar watch is made up of numerous pieces which must be carefully adjusted to each other to evolve the perfect instrument. Unlike the piano, however, the extreme precision is exercised in the preparation and the construction of microscopically pre-

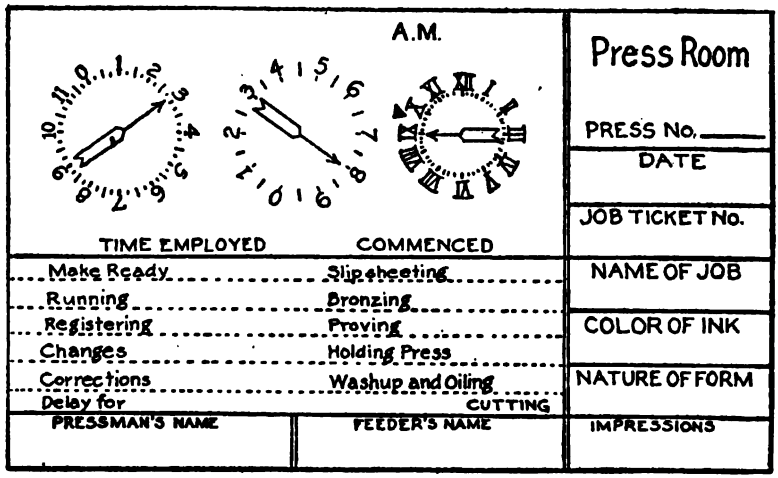


FIG. 62.—Elapsed Time Impression. Press Room

cise punches and dies and highly specialized and costly machinery which, without the wear and tear and subsequent variations incident to more cheaply constructed equipment, turns out vast numbers of parts which fit and functionate to an extremely accurate degree, with but simple routine assembling labor performance. This product exemplifies the mechanical phase. Articles of this type are usually sold under a very broad guarantee, and where individual units seem to work improperly, through no fault of the consumer, an exchange is made without argument. Jeweled watch movements which

Digitized by Google

take on the human phase and have previously been more closely inspected or tested are not thus readily exchanged by the makers.

An industry which is, perhaps, somewhat perplexing to classify properly as between the human and the mechanical phases is that of men's shoes of a widely advertised brand. Here highly specialized machinery is in itself almost human in its functions and performs its work day in and day out without change of gauges, and the human assistance contributed becomes purely mechanical on the part of the operative. There is not here present the frequent shiftings between sizes, styles, and other characteristics present in ladies' extremely fashionable shoes.

Reciprocal Assembling Preparation

Reciprocal is here used in the sense of mutuality of purpose, wherein each action has direct reference or correspondence to other contemporaneous actions or preparations in such manner that each affects the other and is equally affected by it.

In this class of producing industries the material is put in process, is worked upon and assembled without the intervention or the using of any intermediary steps which do not finally show in the finished goods.

This class of manufacturing embraces those goods or units which may or may not be based on certain generic principles, but in which the extent of the production is scaled precisely in accordance with the customer's explicit instructions. As a minor example of this may be cited a jobbing machine shop, and as a major example, shipbuilding.

Digitized by Google

NAME _____ No. _____

DEPT. _____ RATE _____

DEPARTMENT	Hrs.	Min.	Pc. Work		Time Work	
312 Box						
322 Printing						
332 Laboratory						
342 Boiling						
352 Drying						
362 Milling						
372 Wrapping						
115 Power						
122 Repairs						
124 Handling stores						
151 Machinery						
718 Handling product						
722 Stable						

THE CLEANSING SOAP CO.

FIG. 63.—Departmental Report Form for Reverse of any Clock Card

Digitized by Google

Engineering or designing work in this class may vary from the pattern for a ballroom slipper to the plans for a forty-story skyscraper. These are not made to cover the production of a series of years, but are for specific seasons or projects; if the order is secured, the plan or design already used in securing the contract may again be used in its completion.

This class of industry, although having a very great deal of machinery, has machinery of a more or less general nature to do work of more than one kind or size. These machines, of necessity, require operatives who can adapt them to do new work and who must guide and direct them while they are running.

In seeking a further distinction between industries of this group we may consider two classes:

1. Standard.
2. Special.

STANDARD CLASS (G)

"Standard," used in this sense, we may define as predetermined routine in which the product, perhaps purely seasonal in design or predominating characteristics, adhers strictly to prearranged form, color, consistency, or quality of constituent elements with little, if any, departure from regular routine in its preparation.

An example of this is women's shoes, which are designed for a given season and are subsequently made only on the retailer's specific order, embodying a certain range of sizes, etc. The instability of fashion with its curious whims and caprices makes the predetermination of requirements as to constituent parts somewhat of a speculative venture (spoken of as a "gamble"); hence

Digitized by Google

it is not usual to stock up heavily on uniquely shaped parts or colors for purely seasonal shoes.

A standard may be more than seasonal in scope and may be of a permanent nature, covering a probable term of years. An example of this is certain basic parts of a steam shovel. A steam shovel is, in its operation, a matter of considerable cost, surrounded as it is by a crew of men, continually under pay while working or waiting. If a part breaks, the shovel is disabled until a new part can be supplied; if the new part be not standard in all its appointments, confusion and large costs are the inevitable result. The digging of the Panama Canal developed this fact, and incidentally it marked the superiority of American shovels over those of older foreign types used during the first attempts at excavation. To-day in the building of steam-shovel parts if blunders occur, which, in the individual case, might be "patched up," the piece is scrapped forthwith and charged to Over, Short, and Damage. (See account 556.)

In this class certain major or minor portions of product may be carried in stock as "finished parts" and thus take on an aspect of antecedent preparation.

SPECIAL CLASS (H)

"Special" in this use has reference to projects or contrivances having particular marks of distinction designated in words or plans, in order to distinguish them from every other project or contrivance, and having positively determined designations of limitations.

Examples of this class are ornamental iron and bronze work, art-glass windows, steel tanks, experimental machine work, etc. This class is the technical

Digitized by Google

antithesis of manufacturing, and its members are more properly spoken of, perhaps, as pipe-organ builders, steel fabricators, or wagon makers. Before the advent of automobiles the coach builder looked with disdain upon the product of the carriage manufacturer, and the bootmaker in like manner felt contempt for the product of the shoe manufacturer. We see in the present-day advertising claims for particular merit through the "loving care" exercised in individual industries, which, however, takes us from the producing to the commercial phase of business. In the production of goods the volume of "loving care" is measured largely by the difference between cost price and selling price.

It is in this class most largely that the budget system and the sold-hour plan of cost finding are most effective.

Digitized by Google

PART FOUR—PRODUCTION ELEMENTS

CHAPTER XV

MATERIAL

Physical Audits

All business is a conversion of assets which usually has for its ulterior purposes a final exchange into the asset with which the process ordinarily starts, i. e., cash. If the business is successful, the amount of cash realized on the completion of the cycle is greater than the amount of cash originally invested; but in any stage of the process the values on hand, whether material, machinery, labor, overhead expense, etc., are merely cash in another form and, within reasonable limits, should be guarded with the same jealous care. As a matter of fact, in some modern factories material is almost as closely checked as cash. A similar close checking of material is sorely needed in many other factories.

To the solvent manufacturer, a dollar is a dollar, no matter what state it be in—money, accounts receivable, goods in store, or goods in process. Workmen do not, as a rule, have the same wholesome respect for twenty dollars in the form of castings that they have for twenty dollars in the shape of a gold piece, but there is no

Digitized by Google

difference in point of value, and while the same kind of care is not required for each, it will not be disputed that proper factory management will guard the one as carefully as the other. For the record of the one the Cash Book is employed; for the record of the other, the Stock Ledger (Figure 32).

The logic is not clear, but the fact is evident that while manufacturers put their financial officers under heavy bonds for the safety of funds intrusted to their care, they are apt to ignore completely the oftentimes wanton waste of good material which goes on day after day within range of the manager's vision.

We may perhaps find a manufacturing jeweler guarding his store of precious metal closely, but he does this because of its high intrinsic value and the ever-present resulting danger of theft. To a certain extent we may find brass stocks closely guarded—a careful watch and check being kept on parcels carried out of the foundry or factory by workmen. Theft, of course, is always to be guarded against, but this is not the form of loss to be feared in the ordinary factory. It is waste through spoilage, misplaced supplies, improper exposure, in other words, losses arising from carelessness and indifference rather than from dishonesty.

Material in stores is lost, improperly issued, spoiled by improper exposure, destroyed by careless handling, forgotten, and overlooked. Material in process is lost or destroyed with the same careless indifference; or a costly leak when not prevented by proper controlling records is made up for stock, stored away, and then overlooked at the time when wanted; or the discovery is made that a considerable oversupply exists. Frequently the wastage from material lost or spoiled is not so much

Digitized by Google

ELECTRIC ELEVATOR COMPANY
DAILY TIME REPORT

Employee.....
No.....Time Work Rate.....
Dep't.....Date.....

THIS SPACE FOR OFFICE USE ONLY

Piece Work ..... h. ..... m. ..... $ ..... | ....
Time Work ..... h. ..... m. ..... $ ..... | ....

Total Productive h. ..... m. ..... $ ..... | ....
Non-Productive h. ..... m. ..... $ ..... | ....

DELAYS WHEN UNDER TIME WORK PAY

1. ..... m. Cause No.	5. ..... m. Cause No. .....
2. ..... m. " "	6. ..... m. " " .....
3. ..... m. " "	7. ..... m. " " .....
4. ..... m. " "	Total ..... m. $ .....

STOP	Order No. ..... Time Work - Piece Work Operation ..... Quantity			
START	DELAY No.	TIME	LABOR	OVERHEAD
STOP	Order No. ..... T.W. P.W. Operation ..... Quantity			
START	DELAY No.	TIME	LABOR	OVERHEAD
STOP	Order No. ..... T.W. P.W. Operation ..... Quantity			
START	DELAY No.	TIME	LABOR	OVERHEAD
STOP	Order No. ..... T.W. P.W. Operation ..... Quantity			
START	DELAY No.	TIME	LABOR	OVERHEAD
STOP	Order No. ..... T.W. P.W. Operation ..... Quantity			
START	DELAY No.	TIME	LABOR	OVERHEAD

COUPONS USED
.....

MAN NO.	D	DATE
MAN NO.	5	DATE
MAN NO.	4	DATE
MAN NO.	3	DATE
MAN NO.	2	DATE
MAN NO.	1	DATE

FIG. 64.—Start and Stop Coupons for Specific Jobs by One Operative during One Day

Digitized by Google

in the intrinsic value of the material as in the workmanship and expense, or overhead, already absorbed by this material—a fact frequently lost sight of in plants lacking a cost system.

The Stock Ledger properly maintained is the most effective and ever-present method of detecting losses of material. Some of the sources of loss have already been referred to, i. e., wastage, spoilage, and thieving. A not uncommon variation of this latter occurs where material is taken by the workmen to replace spoiled parts, these spoiled parts being concealed, destroyed, or otherwise disposed of.

Occasional causes of loss—very difficult to locate—are due to irregularities in the purchasing department. Perhaps the commonest cause of such losses is the dishonest, or more mildly expressed, improper practices of the purchasing agent.

Losses of this nature are not disclosed by the Stock Ledger and can only be prevented by the employment of men of a high standard of business morality. Other losses in the purchasing department will for the most part be shown by, or be prevented by, the Stock Ledger.

When goods are paid for but never received, it results in an increased production cost. In plants where but one line of goods is produced and the cost accounts are limited and consist mainly of Material, Labor, and Manufacturing Overhead, with perhaps a few subdivisions under each, such losses are a direct charge to the Material Account and would probably never be discovered. Even in plants where specific costs are found and a going inventory is maintained, goods billed but not received sometimes slip through the Stock Ledger.

Digitized by Google

MIXING LABOR THE COLORED PAINT CO.

USE A SEPARATE SHEET FOR EACH CLASS OF LABOR EACH DAY

Name _____ No. _____

Approved _____ Foreman

Total Time _____ Hrs. _____ Mins. Cost $ _____

LEAVE THIS BLANK	ORDER NO.	QUANTITY	STARTED		STOPPED		HRS.	MIN.	VALUE	
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										
MIXING										

FIG. 65.—Start and Stop Coupons for Orders Processed by One Operative during One Day

Digitized by Google

In such cases the cost of the missing goods will not show against any specific shop order, but the loss has been incurred just the same, and when an inventory or check up (Figures 48 and 49) is made of the particular class of goods, and this inventory is compared with the record of the Stock Ledger, the shortage is uncovered. The accountants may never be able to ascertain just how the difference occurred, but the loss is there and must be spread over product in some way, most satisfactorily by including it in diffused overhead.

An account designated "Variation of Weights and Measures" (Figure 9, account 143) is the barometer of inaccuracy or dishonesty which shows the loss on goods missing, stolen, or not received. To this account, or preferably to its counterpart designated, "Reserve for Variations of Weights and Measures" (Figure 9, account 558), is charged all such differences as they are found.

Every factory has its own peculiar "waste centers." Thus the cutting room, where such a room exists, is usually a waste center, no matter what the goods may be. It is the province of the accounting system to point out these waste centers and to show just where the waste occurs. The burden of correction is then thrown on the management. The cost system will disclose the leak, but cannot stop it.

The prevention of unnecessary waste is an important and even vital feature of low costs and a full and economical utilization of factory capacity. The only positive way in which waste through blunders may be minimized or perhaps prevented is through a form of report (Figure 51) which calls for a specific statement as to the work spoiled, the workman responsible, the

Digitized by Google

department and the order number in which it occurred, and the name of the foreman in charge. This enables the superintendent to place the blame where it belongs and to make the loss a part of the workman's efficiency record.

An account designated, "Over, Short, and Damage," (Figure 9, account 142) with its correlated reserve (account 556) presents a means of absorbing differences due to losses on material through poor workmanship or goods in process.

Figure 51, as shown, is adapted for use in a machine shop, but may easily be modified to meet the requirements of any other line of production.

Stock Ledger

The Stock Ledger, also called the "Material Ledger" or the "Stores Ledger" (illustrated in Figure 32), is a perpetual inventory of all material coming in and of all issues of this material. It provides for an account with each kind, grade, style, or size of raw material carried in stock.

The department in which the Stock Ledger is actually kept is not a matter of great moment, yet it will usually be found desirable to have it in close proximity to the purchasing department so that it may be referred to readily. There is no established form or shape for this ledger. In some few cases a bound book can be used to advantage, but where the various shapes, sizes, weights, and numbers of units run into the thousands, the bound book is prohibitive and in its stead either the loose-leaf ledger or cards must be used. Under ordinary circumstances the latter are preferable for convenience and quick handling.

Digitized by Google

Where cards are adopted, stringent rules must be observed as to their use, for while cards are good servants, they are notoriously bad masters. When a card is removed from the files, a dummy showing when and by whom the card was removed should *invariably* be left in its place. If a card is kept out too long, it should be recalled. If some such system is adopted and rigidly enforced, the installation will be successful, but if a haphazard use or misuse of the cards is permitted, misplaced cards, lost time, and damaged tempers will be the sure result. Properly used, the author strongly advocates cards, but unless these are effectively safeguarded, the loose-leaf ledger is preferable. The detailed information record in the Stock Ledger covers material received, material issued, balances, and material ordered. At the top of the form, whether card or loose-leaf, space is usually reserved for names of commodities, the minimum number or quantity of the particular article or material to be carried, data concerning size, location, etc.

Under "balances" appear columns for date, quantities, average price of units on hand, and total cost value. Two additional columns are sometimes added with the headings, "Verified by Physical Count" (to be answered by date of verification) and "Amount of Difference" (over or under). The Stock Ledger is usually "ruled down" monthly and balances on hand recorded.

The "Material Ordered" columns can, if desired, be arranged so as to show date, order number, amount needed, and quantity ordered. Items entered under the head of "Material Received" should, of course, agree with the corresponding entries in the "Material Ordered" column, save as to the canceled items, if any. When goods ordered have been received, a check mark

Digitized by Google

is placed in the check column under "Ordered" and opposite the particular item.

The details of a properly maintained Stock Ledger may at times seem tedious and tangled with much red tape. While this is so, if the methods are right, it is red tape that holds substantial values as protection from waste and disappearance—red tape that is worth while. When material is closely accounted for by a Stock Ledger, discrepancies are quickly discovered and finished or semi-finished goods cannot be overlooked. The Stock Ledger will show any discrepancies in material as clearly as a customer's account will show a debit balance. The Stock Ledger will also show just what amount of money is tied up in raw materials, in goods in process, and in store stocks.

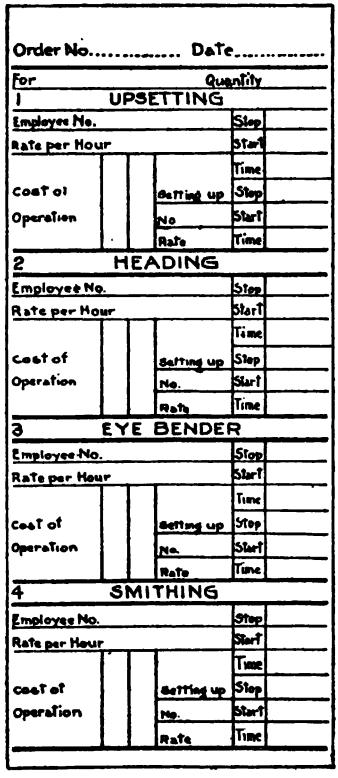

Order No..... Date.....
For Quantity
1 UPSETTING
Employee No. Stop
Rate per Hour Start
Time
Cost of Operation Setting up Stop
No Start
Rate Time
2 HEADING
Employee No. Stop
Rate per Hour Start
Time
Cost of Operation Setting up Stop
No. Start
Rate Time
3 EYE BENDER
Employee No. Stop
Rate per Hour Start
Time
Cost of Operation Setting up Stop
No. Start
Rate Time
4 SMITHING
Employee No. Stop
Rate per Hour Start
Time
Cost of Operation Setting up Stop
No. Start
Rate Time

FIG. 66.—Start and Stop Coupons for Various Operations on One Specific Order. Time Work

To reap the greatest benefits from the Stock Ledger it must be kept continuously and systematically. The Stock Ledger is not merely a means of keeping track of the stock. This is an important function, but beyond this it will enable the manufacturer to adjust his stock to his needs so that the capital tied up in stock is reduced to the lowest safe figure. Also, if properly kept, the

Digitized by Google

Stock Ledger will enable the manufacturer to take monthly "paper inventories," approximately correct, and prepare profit and loss statements each month, showing accurately the progress of the business. Where a General Exhibit is used, the controlling account shows synthetically the total of the balances in the Stock Ledger, as may be seen in Figure 15 under "Stores and Stocks." Where a controlling account is used, a "proof of postings" is had by drawing off a list of the balances of each separate account and comparing the net total of these balances with its synthetic or controlling account.

The first function of the Stock Ledger is, however, the conservation of material—a function of sufficient importance in itself to justify amply the maintenance of the record. Not only does it effect a large, direct saving in stores, but it is also true that in shops where material is most carefully accounted for, losses from scrap and waste are always proportionately light and the general appearance of the shop the best.

Purchases

Requests or requisitions for the purchase of material (Figure 33) usually emanate from the stores department. They are made out by the stores clerk or some equivalent official and are sent to the material division of the cost department for registration. Here by reference to the stock record, the propriety of the proposed requisition is determined. If the purchase is approved, the order is entered in the "Record of Goods Ordered" (Figure 18), where one is kept, and the request for purchases is turned over to the purchase department, where a purchase order (Figure 34) is made out in accordance with the request and the order is placed.

The completeness of the information conveyed in the

Digitized by Google

request for purchases will depend entirely upon the system in force in the particular establishment. Under some systems detailed information is incorporated in the request, as for instance, the number of units on hand, the number needed for immediate consumption, the number already ordered but not yet received, etc. On the other hand, requests for purchases are sometimes mere statements—each under a number which becomes the number of the corresponding entry in the "Records of Goods Ordered"—of the fact that certain goods are needed. The purchase request must, of course, be signed by the proper party. In some large concerns two or more signatures are required for the validation of purchase requests.

THE MENZ UNDERWEAR CO.

BALMESH UNION SUITS.

OPERATION	OPERATOR No.	PAY COUPON
p bord		P Brd U3½bm
t thrds		T Thrds U1½bm
bt up		Bt up U1½bm
b sew		B sew U3½bm
b hole		B Hole U3½bm
bm label		BM Label U1bm
tacking		Tack U½bm
f coll		F Coll U½bm
coll		Coll U2½bm
bind fnt		Bind fnt U3½bm
facing		Face U2bm
b stay		B Stay U2bm
tn bak		TN Back U3bm
cut n&f		Ct N&F U1½bm
t ndle		T Needl U1bm
mk nek		Mk nek U½bm
turn		Turn U1bm
seam		Seam U12bm
cro fly		Cro Fly U3bm
cuffs		Cuffs U2½bm

FIG. 67.—Piecework Coupons for Various Operations on One Dozen Garments. Standard Production

The purchase order under any modern system of business organization is a printed form upon which the details of the specific order are entered. When these have been entered, the purchase order is sent to the supply house or concern from which the goods are bought and becomes its authority for the delivery of the goods ordered, in conformity with the terms of the purchase order. There

Digitized by Google

is no fixed wording, style, or form for purchase orders, the matter being entirely within the discretion of the individual concern. They should, however, as a matter of course, be as clear, direct, and specific as they can be made.

Whatever the general wording and arrangement adopted, the purchase order should always bear a serial number and a request that this serial number appear on the seller's invoice. This is a matter of some importance for, in case any question arises as to the authority for an order, or as to the quantities or quality on other conditions of a bill of goods, it is a simple matter to turn to the duplicate of the purchase order, which is filed under a serial number, and determine the facts.

The purchase order is usually composed of a set of four duplicates, though occasionally purchase systems call for sets of smaller or even larger numbers. While commonly referred to as duplicates, the different copies of the purchase order set are not, strictly speaking, duplicates, for while the specific order details, which are typewritten in, are the same on every copy of the set, the printed matter usually varies on the different copies. The variation in the printed matter is shown in Figure 34, which illustrates the four numbers of a purchase order set.

The different copies constituting a purchase order set are prepared at one operation by the use of carbons. When four copies are prepared, the different copies are utilized as follows:

1. Sent to supply house.
2. Filed in numerical order in the office.
3. Placed temporarily on "Unfilled Orders" file.
4. Sent to receiving department.

Digitized by Google

When orders are important and to be closely safeguarded, the blanks constituting the set of four copies are printed on a single sheet of paper, part on one side of the sheet and part on the other, each separated from its fellows by perforations. Copies 1 and 3 appear on the face of the sheet, and copies 2 and 4 on the reverse of the sheet, in such manner that an "accordion" fold of the sheet will bring the consecutive copies in sequence, all facing the same way and registering so that when carbon paper is placed between, all four copies may be prepared in one writing.

These Purchase Order Sheets are machine numbered and padded. If a sheet is spoiled, it is destroyed, save as to copy 2, by the proper officer or department head. The destruction of the other copies is tersely recorded upon copy 2, which is then filed in its proper numerical order with the other copy 2 purchase orders, so that every sheet is accounted for. This plan precludes the possibility of promiscuous or unauthorized orders.

For convenience in handling, it is desirable that the different copies of a purchase order shall readily be distinguishable one from the other. For this purpose when all copies are printed on a single sheet, different styles of type or different colored inks may be used. When copies of the set are not printed on one sheet, they may be distinguished in the same way, but are best differentiated by the use of a different colored paper for each copy. Sometimes they are distinguished by the quality or weights of paper used. Another excellent plan of distinguishing the different copies is to have a large designating figure printed on the corner of each copy, save the first.

The printed wording of the purchase order usually

Digitized by Google

varies, as stated, on the different copies. Thus copy 1, the original, is in its usual form a direct order for goods. In addition it sometimes carries an acknowledgment "extension" on the left-hand side, separated from the purchase order proper by perforations. This acknowledgment is to be signed and returned by the party receiving the purchase order, and if properly worded it becomes, when so returned, not only an acknowledgment of the order, but its positive acceptance at the price and on the terms stated in the purchase order. If this acknowledgment is not promptly received, a request for its return is sent out by the purchasing department.

Copy 2 of the purchase order, the office copy, instead of reading as an order, may perhaps state the fact that "an order has been placed with the Johnson Hardware Company for goods listed below." In addition, as shown in Figure 2, this form may also provide blanks for recording the subsequent transactions relating to the order, such as "date invoice," "date goods received," "invoice approved," etc. When these blanks are filled, copy 2 constitutes a full and complete history of each and every purchase order. These data should be recorded systematically, the copy 2 purchase orders being written up, perhaps once a day, from the accumulated invoices. The office copies of purchase orders should never be removed from the file, reference being made to them when necessary in the file.

Copy 3 is usually similar to copy 2 as to its printed wording. It really requires no special data, save under the one head "Date Promised," as it is placed on the unfilled order file only, serving there as a memorandum and a reminder of the order until the goods are received. At that time it is removed and attached to the invoice, or it is otherwise disposed of according to the

Digitized by Google

system in use. In case orders are but partially filled and the remainder of the order is to come later, the received items may be checked or otherwise indicated on copy 3, which is left on the unfilled orders file until all the goods it calls for have been received or until the unfilled items have been canceled.

Copy 4 is for the receiving department, and its printed matter is usually worded as a notice to the receiving clerk that the articles listed on the order should be received from the concern named, on or about the speci-

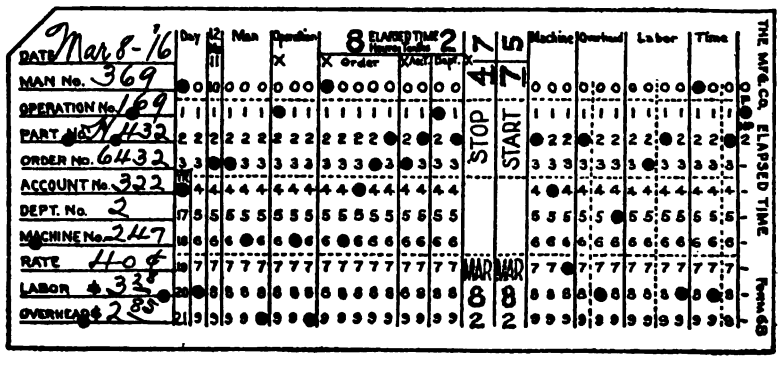


FIG. 68.—Elapsed Time Impression and Perforation

fied date. On this copy a short-width carbon may be used, so that while the items show, the quantities of these items do not. This forces the receiving clerk, in order to complete his record, actually to weigh, count, or measure all goods received, instead of taking his quantities from the purchase order.

Copy 4 may, if desired, have upon it a certificate to be signed by the storekeeper, or by the foreman in cases where goods are delivered directly to the department for which purchased, stating that the goods have been

Digitized by Google

received. The final resting place of copy 4 will depend upon the system in use.

Automatic Records

A certain flat-platen typewriter equipped with enough adding and substracting attachments can be utilized to post items to the material ledger cards or ledger sheets, entering individual charges and credits to the various accounts involved and automatically showing up, after the entry of each transaction, the remaining quantity on hand and its money value. This device can be gracefully used in conjunction with automatic sorting cards (posting totals therefrom) or with manually handled records in any manner desired within its limitations. The adding and subtracting features present possibilities of use in various capacities in factory accounting. In the use here stated concerning the Material Ledger, it can be made, in addition to the features mentioned, also to accumulate a total money value of all items posted, thus proving the accuracy of the posting work. For example, the charges to order numbers as shown on Figure 47 must have offsetting credits, as listed in the lower right-hand corner under the caption "Summary." The posting to the Material Ledger may be done previously or subsequently to the assortment by order numbers; under ordinary circumstances, it is better to post the credits first, so that the material card may rest in the order number files undisturbed. In either case the posting of items listed on Figure 47 to the "foundry material" section of the Material Ledger will, if accurately done, aggregate $6,918.12; hence a proof of accurate posting is had both as to Goods in Process charges and Material Stores credits.

Digitized by Google

This operation does not, of course, prevent the posting of an item, or items, to the wrong account under the proper classification.

Figures 35, 36, and 37 respectively represent cards used on automatic sorting and adding machinery. The forms presented are used in connection with material and will be further described in a succeeding section.

A card carefully designed for each intended use and correctly punched to indicate the facts which it is desired to classify and accumulate makes a permanent record. This may be sorted or analyzed and added in accordance with any predetermined scheme, or at any time, to obtain special information as the exigencies of the business may require. The whole system hinges on the card; but the punched card with the sorter and adding device forms a complete statistical or analytical unit from which immense advantages may be obtained.

Numerical codes must be used to represent certain data. The data on the card must be all which might conceivably be of use in any analysis of this sort, providing for both current requirements and possible additional special reports as called for.

In the application of the code or order numbers of the accounts to be recorded by these cards, it is not simply a question of the notation of numbers and figures on the card, but of the indication of these symbols by means of holes or perforations at measured distances from the top and bottom and the ends of the card. This could, of course, be done on blank cards. As a matter of greater facility in the reading of the codes, however, the card is printed on one side to assist in determining the location of the code signals and thus

Digitized by Google

at any time permits checking the card against the original data.

Technically considered, a horizontal line of numbers on the card is a "row" and a vertical line of numbers is a "column." Where these columns are separated by solid vertical lines, "fields" are formed, each field being comprised between two such lines. These fields are of two classes: (1) the topical field, for records of standing data, such as dates, departments, etc., and (2) the statistical or adding field, for amounts which are later to be summarized or added. The operation thus consists in the sorting or the grouping of the cards according to the topical fields and in the aggregating or the adding of the amounts in the statistical fields.

While the number of columns is variable, the number of rows, as well as the height of the card, is constant. Those fields in which additions are made utilize ten rows, because of the limitations in the decimal numerical system, ten digits being required to produce one of the next higher order. For dates (12 months in the year, etc.), and also for certain specific symbols or codes connected with each individual business, two additional rows are available in the topical fields.

The original data coming to the recording department in various forms, are recorded on the cards by means of a punch operated by keys. The rate of punching varies materially with the amount of information carried on the different cards. It is more rapid than ordinary card writing or the usual speed of journalizers or entry clerks in bookkeeping. Depending upon the number of holes punched, cards are handled by seasoned operators at the rate of 1,500 to 4,000 per day. The

Digitized by Google

average output might be stated to be not far from 2,500.

In nearly all cases mechanical sorting is necessary before the cards can be used to obtain the analysis required. The "sorting machine" is used for the arrangement and the rearrangement of the cards into orderly groups, such as by material classifications, order numbers, etc. This effects the sorting or classification of records with almost incredible rapidity and with

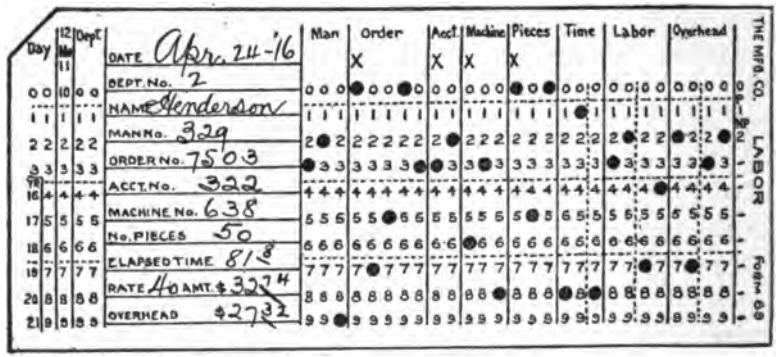


Fig. 69.—Labor Card Punched from Separate Time Records

practical certainty of accuracy. Once this sorting has been made, the cards are run through the adding device, and such totals as may be necessary are obtained. If then any further sorting is required, the same set of cards which has been run through the adding device (in as many sections as the previous "sorts" made necessary) is again put into the sorting machine and resorted in accordance with some other scheme, and again run through the adding device to obtain the analysis on that basis.

Digitized by Google

Purchase Cards, Automatic

Figure 35 represents a form of automatic sorting card for recording data concerning purchases. It is punched in accordance with the sixth line on Figure 17. This card is intended to show information as follows:

Topical Fields:

Date. Day, month, and year. In this case it is used with reference to the date of payment; it may be used for invoice date if desired, provided each invoice is represented by one or more cards.

Order Number under which the goods were purchased; this field may be used for voucher number under which the goods are paid for.

Account, having reference to the account number symbols such as shown on the chart, Figure 9, "foundry material" (70); "raw castings" (80); "manufacturing expense" (100); "machinery" (404), etc. In this case it is "factory material" (74).

Symbol, representing the classification to which the charge is properly distributed; usually a subclassification under the account number. If there are several items on one invoice and each item is chargeable to a separate account or classification, there will be a separate card made for each. In Figure 17 the three invoices shown as being paid for by check No. 8493, namely, 1/18, 1/29, and 2/3, are presumed to be all chargeable to account 74 (Factory Material), the same as that invoice (2/3) which appears on line 2 of Figure 19.

Digitized by Google

Cards, meaning the number of cards involved under a given check number. In this case there is but one; if each of the three invoices involved had one or more cards, the punch would be made to indicate the exact number.

Bank, meaning the number of the bank on which the check is drawn. In this case it is Bank No. 2, as shown in Figure 17.

Check number, meaning the serial number of the bank check. In case there is more than one card, this number being purely topical is shown on all the cards involved; where more than one card is involved, the check amount and the discount is shown on only one of the group.

Statistical Fields:

Check amount, being the net amount of the bank check and constituting the main credit item on the card or group of cards. Where there are two or more cards under the same voucher number or check number, this amount is shown on only one of the group in order that the same credit be not considered twice.

Purchase amount debit, this being the gross amount of the purchase and constituting the only debit amount on the card; where a number of cards are involved under one check, this amount corresponds with the individual item, or items, under any one symbol.

Discount credit, being the cash discount, if any, involved in the transaction; this should not appear on more than one card on any one check number.

Digitized by Google

Various credit, being space for recording any extraordinary transactions, as for example the twelfth and sixteenth lines in Figure 17.

This card may be used in connection with the bank accounts and the Check Register Sheet (Figure 17), and also in connection with the Purchase Analysis (Figure 19) in automatically analyzing the various stores accounts for posting amounts on the Stock Ledger card (Figure 32) and automatically analyzing expense items instead of the handwork exhibited on Expense Analysis Sheet (Figure 83).

Finished Order Cards, Automatic

Figure 36 represents a form of automatic sorting card for recording cost data concerning finished parts and finished product. This card is punched in accordance with Order No. 7503 on Figure 20. The order is entered April 11 and presumably is finished April 22. This card shows information as follows:

Topical Fields:

Date. In this case it shows the hypothetical date of completion of the work on the order.

Order number, meaning the production order number.

Account, having reference to symbol numbers shown on Figure 9. In this case it is "finished product" (84).

Symbol, representing a subclassification under the account number. In this case the hypothetical number is 104 (not elsewhere shown).

Digitized by Google

Statistical Fields:

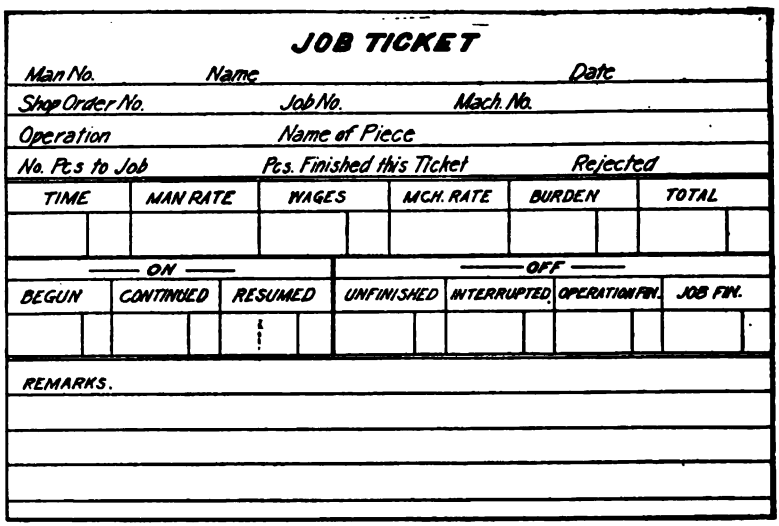
Quantity, meaning the count of items actually finished.

Material, meaning the total money cost of charges against the order number for raw material and finished parts entering into the work.

Labor, meaning the total money cost of charges against the order number for all items of direct labor entering into the work.

Time, meaning the total number of hours and decimals of hours consumed by direct labor applied to the work.

Expense, meaning the total money value of expense overhead diffused over or applied to this individual order number, presumably based upon the number of hours consumed in the work.



JOB TICKET

Man No. Name Date

Shop Order No. Job No. Mach. No.

Operation Name of Piece

No. Pcs to Job Pcs. Finished this Ticket Rejected

TIME	MAN RATE	WAGES	MCH. RATE	BURDEN	TOTAL

ON			OFF			
BEGUN	CONTINUED	RESUMED	UNFINISHED	INTERRUPTED	OPERATION FIN.	JOB FIN.

REMARKS.

FIG. 70.—Job Ticket for One Day. Time Written

Digitized by Google

This form of card can be used to arrive automatically at the various segregations incident to the finished order portion of Figure 20, thus doing away with much "handwork" and still retaining the "proof by balance" feature. Where these cards are employed, the segregation of charges to Finished Product, Special Equipment, etc., is quickly and automatically obtained for control purposes and general accounting needs.

Material Issuance Cards, Automatic

Figure 37 represents a form of automatic sorting card for recording data concerning issuances of material and finished parts (semifinished product) from Stores and Stocks to Goods in Process or to any other use which such issuances may be put. This card is what is called a "dual card" in that it has both written and punched information upon it. It is filled out with data in connection with Order No. 6432, as shown on Figure 20. The punched information to be shown on this form of cards is as follows:

Topical Fields:

Date. Day, month, and year in which the goods were drawn from stores or stocks.

Order Number. The production order number when it goes into goods in process; or the consecutive order number, where such a series is maintained for expense orders for work other than direct production.

Account, having reference to the account number symbols such as shown on the chart, Figure 9, "material (and parts) in process in department

Digitized by Google

2" (320), "reserve for maintenance of buildings" (562), symbol (50) (as shown in the 100 group), etc.

Symbol, representing the classification to which the charge is properly distributed (as in the preceding paragraph concerning maintenance of buildings classification).

Department, indicating the number of the department to which the goods were delivered.

Unit, showing the character or basis of the count, weight, or measure. In this case the numbers are used entirely in a code sense and only the digit having a numerical value is considered, the other perforation being either on the O "row" or on the X "row," which in this case is used merely as is a space bar on a typewriter—to send the card along one space. The letters appearing above the numbers have meanings as follows: Pc., piece; Dz., dozen; Gr., gross; Oz., ounce; Lb., pound; T., ton; Lf., lineal feet; Sf., surface feet; Cf., cubic feet; Bu., bushel; Pr., pair; Qt., quart; Pk., peck; Cd., cord.

Credits, having reference to the account number of the classification from which the goods were drawn and the symbol number representing the subclassification, which may mean a storeroom number, a section and shelf number, a general material classification number, or whatever may be desired under the system in use.

The last column has sorting significance as follows:

3 Fd.—Foundry Material
4 Wd.—Wood Shop Material

Digitized by Google

5 Fm.—Factory Material
6 Su.—Supplies
7 Cg.—Castings
8 Pt.—Parts
9 Pr.—Product

Statistical Fields:

Quantity, meaning the count, weight, or measure of the goods involved.

Value, indicating the amount of money involved.

When these cards are employed, they usually follow such a routine of handling as is described on pages 173 and 175. In addition they are used for assortment under the "stores and stocks" group of accounts, the same value being involved in the debit as in the credit. In effect Figure 37 is a journal entry as follows:

Material in Process, Dept. 2	$28.19	
Raw Casting Stocks		$28.19

Beyond this it shows the exact order number on which the material was used and the classification of charges under the order number (the order number being hypothetical as here used), also the storeroom number or general group of material to receive credit on the Stock Ledger (Figure 32).

Material Issuance Cards

Storeroom requisitions for material, or "stores orders" as they are termed, are found in many different forms, due to the fact that products and requirements in the different lines vary so widely. Thus in one line several months may perhaps intervene between

Digitized by Google

the time the factory order issues for the building of a given number of units and the time the first unit of a lot is finished. In other lines of production, orders for component parts or elements to be made up for stock are issued as may be necessary to maintain the

JOB NO	CURNT ELECTRIC MFG. CO. TIME SLIP Motor Assembling Dep't. PUT ONLY ONE JOB ON THIS SLIP – TURN IN DAILY		
DATE	NAME	NO.	DAY WORK
MARK X IN THIS SPACE DAY JOB IS STARTED ONLY	TYPE & SIZE OF APPARATUS	DRAWING NO. OF PART	
NUMBER FINISHED	NAME OF PART		
	OPERATION		
		TH ON JOB	HRS.

		15	30	45
A M	7			
	8			
	9			
	10			
	11			
	12			
P M	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
A M	1			
	2			
	3			
	4			
	5			
	6			

FIG. 71.—Job Ticket for One Day. Time Indicated in Quarter Hours

proper visible supply. Or, again, when the component parts or elements of a machine are in stock, an order for a given number of completed units is practically nothing more than an assembling order.

It not infrequently happens that a production order is issued for a given number of finished units to be made up from start to finish, save for certain interchangeable parts which are usually made up for stock on separate production orders and requisitioned as

Digitized by Google

needed. It sometimes happens that the stock of these parts is exhausted at the time the unit orders are to be put through. In such cases two courses may be pursued. Just enough of the parts may be made up for the immediate unit order, in which case they are either made on a separate order number or are included in the unit order number, and the surplus is then transferred to stores or to another order number.

The charges for raw material furnished for production orders covering semifinished product are handled in the same manner as similar charges to production orders which cover completed product.

Figure 38 shows the face and the reverse of a material card form, which is intended to be hand assorted to individual production order numbers after the manner described on pages 168, 169, and 170. These cards are usually issued in connection with a detailed specification or bill of material, and when, through spoilage or otherwise, excess material is needed, it is drawn on a card such as is shown in Figure 39, excess material card. It may be noticed on the reverse portion of this form that space is provided (under quantity) for drawing more than probable needs, with provision for showing amount returned and the extension of the net amount used.

Figure 40 is the same as Figure 38 in effect, save that it is a requisition for finished parts instead of for raw material. The method of handling these two forms is identical in each case; the colors of the cards usually are different to facilitate ready handling and sorting under "stocks and stores" classifications.

A convenient form for issuance of material in con-

Digitized by Google

nection with a given order number may be devised in the shape of a large-sized tag numbered and perforated to permit the easy separation of its coupons. When more or less rough handling is given the tag through the factory, only the material coupon is perforated, while the labor coupons, where they exist, are clipped off with a shears. Figure 41 shows such a form; the upper portion has space for data concerning the order, and coupons are appended for each of the succeeding labor operations involved, at the bottom appearing the material requisition or order. Where this plan is employed, order tags are prepared in different length or numbers of coupons, so that a choice may be made to fit the number of operations involved.

Figure 42 represents an order for the making of machine knives. In this case the workman has a stock convenient to this work, and he makes report of just what he uses, presumably working the stock to advantage. A record is kept of the scrap he makes on each job, which, compiled monthly, registers his efficiency in the use of his material.

Figure 43 is a form that may be used by a subsidiary shop or plant in making daily reports to the main office for material and supplies drawn from stores.

Figure 44 is what is known as a "bill of material," covering all goods that go into a given order number for standard product. Where this is used, one charge is made to the order number under Goods in Process and one credit is passed to Stores and Stocks. In this case it is usual to issue the material in boxes or "tote-pans" all at one time; if certain goods are "out," the item or items are "back-ordered" and the bill of material is held by the storekeeper until the items are supplied.

Digitized by Google

Various Material Forms

Figure 45 is a receiving sheet kept by the storekeeper, upon which he indicates finished parts coming into his possession from goods in process. This is important in registering a count of such parts as are finished, and also it gives the signal to the cost department that the good have passed out of the process state. Where this form is used, it is usual to "post" the items to the Production Register (Figure 20) under the heading of "Inventories, Finished."

Figure 46 represents a form for the dual purpose of analyzing or classifying the various requisitions or coupons upon which the storekeeper issues material or parts and of furnishing him with a receipt for such requisitions. A carbon copy is kept of the form, and in the upper part of it he gets someone's receipt for such requisitions as he turns over. This feature is important to the storekeeper, as when the requisition (cards, tags, or whatever be the form) leaves his possession, his only evidence of the transaction is his carbon copy of the analysis or summary sheet.

Figure 47 represents a sheet for use on an "unlimited split" adding machine according to the names described on pages 168 and 169. This purports to be sheet 16 as listed on General Exhibit, folio 2 (Figure 12), line 28. An error in allocating inadvertently occurred in entering this on the Exhibit; this in actual practice would be corrected in a following Exhibit folio, by merely transferring the amount from one group to another. The reader may find the error for himself by reference to Figures 9 and 12.

By reference to Figure 47 the following totals may

Digitized by Google

be seen, which summarized for entry in the General Exhibit appear as follows:

Material in Process	$42,094.71	
Manufacturing Expense	962.14	
Foundry Material		$ 6,918.12
Woodworking Material		3,328.75
Factory Material		9,413.28
Supplies		962.14
Raw Casting		8,642.32
Finished Parts		13,792.24
	$43,056.85	$43,056.85

THE SWEETZ BAKERY
Cake Dep't
DAILY TIME SHEET

Name _____ 191__

UNITS	TIME	NAME OF GOODS	KIND OF WORK
0	6:00		
1	:06		
2	:12		
3	:18		
4	:24		
5	:30		
6	:36		
7	:42		
8	:48		
9	:54		
10	7:00		
110			
111	:06		
112	:12		
113	:18		
114	:24		
115	:30		
116	:36		
117	:42		
118	:48		
119	:54		
120	6:00		

1 Mixing
2 Laying out
3 Baking
4 Packing
5 Trimming
6 Setting together
7 Icing
8 Cutting
9 Wrapping

FIG. 72.—Daily Time Report. Time Indicated by Time Unit Numbers (Six Minutes)

Digitized by Google

By using the double adding feature of the adding machine the items can be listed in one of the "counters," and when totaled, the total can be "transferred" to the other "counter" and thus can be had both the total for the individual departments and the total of totals.

Figure 48 presents a method for checking up the physical count of stocks and stores with the Stock Ledger cards (Figure 32). When certain items or groups of items are low, the Stock Ledger clerk fills out one of these forms, showing whatever items he wants checked up by actual count, measure, or weight. This figure represents perhaps the entire contents of a nut storeroom or compartment, referred to in this case as the "nut shed." The figures hereon are transferred to Exhibit, folio 2, line 3 (Figure 12).

Figure 49 is a large form for use when entire departments of stores and stocks or goods in process are to be taken. This form is for permanent record and is punched for a sectional post binder. A divisional sheet can be placed between each department, showing on its face the inventory totals and the totals of the Stock Ledger controlling account involved or of the departmental Goods in Process Account, as the case may be, also data concerning entry date.

Figure 50 presents an ordinary form for inventorying equipment. This form contemplates using the name and the descriptive data for a number of years by having a number of appraisement columns.

Figure 51 is a defective work report to be used when goods in process are spoiled. From this report the cost department secures the necessary financial data for its records and the facts required to relieve the individual

Digitized by Google

shop order of the charges for lost or spoiled material and to transfer them to their proper destination in the Over, Short, and Damage Account. The bottom portion, or coupons, of the loss report is used for an explanation of the physical causes that led to the loss. This coupon goes to the superintendent, placing the facts before him in concrete form. It can be filed finally under the number of the workman through whom the loss was incurred and will then serve as a part of his efficiency record.

Digitized by Google

CHAPTER XVI

LABOR

Time Registration

There is nothing so fatal to the discipline of a plant nor so disastrous to its smooth and profitable working as to have a body of men irregular in their appearance, who come late and go out at odd times. Efficiency is, to a large extent, a matter of faithfulness; and if a factory management insists upon regular and prompt appearance, it is paving the way to good work. There is only one way to stop irregularity—make it unprofitable. If the management weeds out the nondependable individuals, it will before long develop a good working organization. To weed out these undesirables, there should be an accurate record of the entering and the leaving time of all the workers in the concern separate and apart from any cost finding records that may be kept on individual jobs.

It is obvious that the highest efficiency is not possible unless failures to attain this standard are known. Such failures an adequate time system will discover. It primarily indicates costs, but even in this it affords an index to efficiency, for an increased cost is an almost unfailing indication of failure in effort or operation.

When efficiency failures are suspected or known to exist, the time records will show just what and where these failures are. The efficiency failures may be found

Digitized by Google

in slow or careless work on the part of the employees or in the defective operation of machines; or it may be due to accidental interruption to the usual or proper routine of production. Whatever the cause, it will be shown by the time records, intelligently applied.

The proper use of a time system, as applied to cost finding, will also serve to equalize the output in the various departments and to afford a basis upon which to judge the comparative efficiency and desirability of workmen. To the majority of these employees it is an unmixed good, giving a fair and just estimate of their abilities and making them largely independent of the whims and caprices of foremen. What they do is a matter of recorded fact, not ordinarily open to attack, and enables the establishment of a merit system, equitable and adequate, as it is based on actual performance. A more potent factor for increased efficiency could not be devised.

Time Reports

The importance of accurate time reports cannot be emphasized too strongly, for without them accurate cost finding is impossible. If less time is reported on some particular job than was actually consumed, then some other job has to bear the burden, and the findings of the cost system are false and misleading.

The time reporting system, whatever its precise form, should show the total hours of labor expended upon each individual order number or process and also the total of each day's labor. The number of hours devoted to each separate order number is a prime necessity for the distribution of manufacturing expense overhead. The total of each day's labor (Figure 80) is necessary

Digitized by Google

for entry on the General Exhibit (Figure 12, line 22), where it is debited to the proper controlling accounts—which are for productive time, Goods in Process, Labor and for nonproductive time, Accruing Manufacturing Expense—and credited to Accrued Labor.

Time reports vary widely in form and in method of use. Under some conditions individual job cards are used to report the time expended on each separate order number. In this case the time of the employees between "in an out" not reported on their cards, represents the time lost between jobs. Under other conditions time cards are used which show the disposition of the employees' time for the entire day, idle time being shown as well as active working time.

The most efficient form of time report is one on which both the beginning and the finishing time are recorded by a clock or time stamp. This records the facts and precludes the falsification and evasion possible under almost any other conditions. Practically every employer of labor should have a time recorder for exactly the same reason that every merchant has a scale. If he be a small merchant, he needs the scale equally as much. The large merchant merely uses more of the same kind, just as with time recorders.

Where the time register is not in use, time reports must be made out by hand. There are many forms of time reports adapted for this use, ranging widely in scope and character. Some of these are reproduced in Figures 63 to 74. Those shown are all good forms for time recording, and any one of them may be used to advantage under the conditions for which it is adapted. The choice will depend entirely upon the requirements of the cost system in use, as the time record must, of

Digitized by Google

course, "dovetail" with the general plan of cost accounting.

In some shops a timekeeper constantly circulates among the employees and records each change of job. Where this system is in use, the report form shown in Figure 75 may be used to advantage. In other shops the foreman is directly responsible for a proper record of time and makes the time reports himself as the employees report to him—a modification of the timekeeper plan. Neither the perambulating timekeeper nor the recording foreman plan is to be recommended. In nine cases out of ten it will be found that the employees make a pencil memorandum of the "time" to be reported, and if such a record is to be made, it would better be made on the final time report than entered as a merely preliminary memorandum.

It may also be said generally that it is not advisable to make bookkeepers out of shop hands. This is especially true where the class of help employed is illiterate. In such a case any record to be made by the men should be made through the medium of some modern and effective time recorder. Then the act required of the shop hands is merely automatic, and the time is recorded accurately and easily.

Using Time Reports

"Filling in" is, of course, necessary to any form of time card. In some factories the foreman or a clerk makes out the body of the time card, leaving the starting and the stopping time to be filled in by the workman. This latter is probably the best method under ordinary conditions, especially where time recorders are used, as the employees are not then called upon to use

Digitized by Google

any brain capacity whatever in the handling of their time cards. The time recorders do this for them. When enough registers are supplied so that the men need go but a short distance to reach them, less time is required to make this accurate and desirable form of record than is required by the average shop hand to write laboriously a more or less inaccurate record on the card.

Where a machine is under construction, it is advisable in almost every case to work out costs on individual parts rather than to take the machine as a whole. In fact, the cost in its truer sense is not known unless the costs on individual parts are known. Where costs are worked on individual parts, the various parts being made contemporaneously, the shop order can apply to the entire machine or other article, while the various parts can be made under separate or subshop orders, the common order number being used in connection therewith. This plan insures the proper segregation of the time reports under the common shop order number, both for the parts and for the machine or other articles as a whole, and yet the details of work on the parts are presented in such manner that the information may be effectively classified.

Time cards for use with time recorders are shown in Figures 52 to 64 and possibly 65 and 66. A common form of time card where time recorders are not used, has a list of different operations printed on its back, the employee indicating the work he has done by a check mark against the proper operation, thereby saving the necessity of writing it out in full. Included in the printed details of this time card are clock dial imprints, and on these the workman checks his starting time and his stopping time. The dial feature usually consumes more of the workman's time than does the writing

Digitized by Google

of the time in plain figures or the checking of the time in plain figures as shown on Figures 71, 72, or 73.

A fairly good card for use where time recorders are not employed is shown in Figure 70. Here the time space for "on" is subdivided so as to cover the different possibilities. Under the subhead "Begun" is entered the beginning time; under "Continued," the time work is begun on the succeeding day when no other work has intervened; and under "Resumed," the beginning time when other work has intervened.

Time "Off" is similarly subdivided. On the card as shown, under "Unfinished" is entered the stopping time when work is not finished at the end of the day; under "Interrupted," the time when employee is diverted to another job; under "Operation Finished," the time when the work under that ticket is finished; and under "Job Finished," the time when the job is complete with no more tickets to follow.

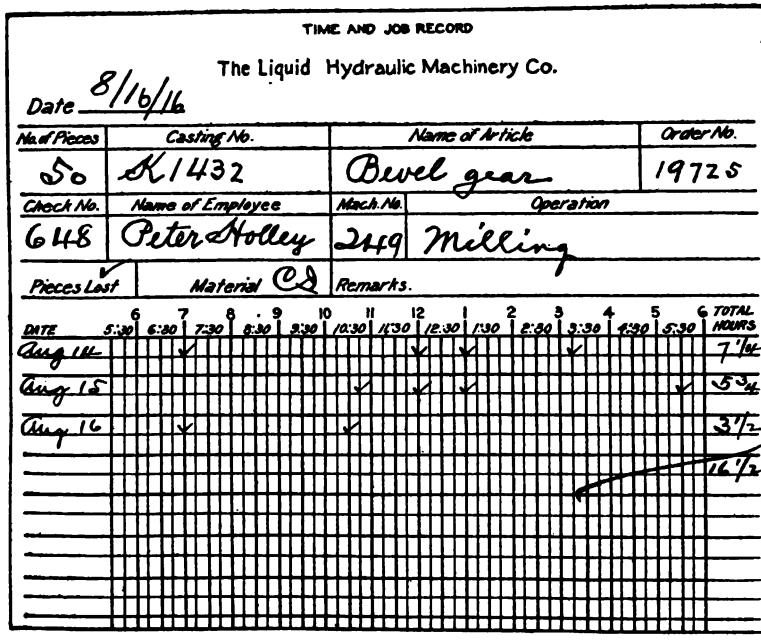
This same form of card may be used with a time recorder if made sufficiently large to provide stamping spaces under or against the different headings. Or, again, it may be adapted for such use more simply by providing a stamping space under both the heading "On" and the heading "Off," the particular subhead referred to being checked with pencil or indicated in some similar way.

Nonproductive and Dead Time

In nonproductive work there should be standing shop orders for the different classes of work; as for instance, "Repairing Machinery," "Cleaning Machinery," "Trucking," "Storeroom Labor," "Sweeping and Cleaning Shop," etc. For such labor the time report

Digitized by Google

is practically the same as for productive labor, except that a designating color is usually employed as a matter of convenience. Also a color scheme for nonproductive time cards may be used to advantage as between dif-



TIME AND JOB RECORD

The Liquid Hydraulic Machinery Co.

Date 8/16/16

No. of Pieces	Casting No.	Name of Article	Order No.
50	K1432	Bevel gear	19725

Check No.	Name of Employee	Mach. No.	Operation
648	Peter Holley	2449	Milling

Pieces Lost	Material	Remarks.
✓	CI	

DATE	5:30	6:30	7:30	8:30	9:30	10:30	11:30	12:30	1:30	2:30	3:30	4:30	5:30	TOTAL HOURS
Aug 14			✓					✓	✓		✓			7 1/4
Aug 15						✓		✓	✓				✓	5 3/4
Aug 16			✓			✓								3 1/2
														16 1/2

FIG. 73.—Job Ticket for Week. Time Indicated

ferent departments. "Nonproductive" time reports will not be used ordinarily by producers unless they are on nonproductive work for the entire day, nonproductive time less than a day being reported on the regular productive form.

Under the machine-hour plan of cost finding a separate card is ordinarily employed for the time when the machine is not in operation; this does not mean the time occupied in the setting-up process, inasmuch as that

Digitized by Google

time should ordinarily be charged in with the running time on the job, as should also any time necessary to put the machine in a condition of readiness to set up for the next job.

One idle-time card will ordinarily suffice for the interval of an entire pay period, but if the stops are too frequent, two or more cards can be used in conjunction with each other during the period. It is not essential that the operator ring "off" on his regular card every time a delay occurs, unless it so happens that the job is completed. He should always ring "on" the idle-time card, however, and "off" when the idleness ceases—the cost clerk can take care of any time deductions that are to be made. When an entire department is required to shut down, the foreman can report on a single idle-time card rather than require each employee to register on the clock. In arranging the printing on the idle-time card, "causes" by number are usually given space on the back and made to read about like the following:

1. Waiting for stock, or mistakes as to stock.
2. Waiting for tools or other appurtenances dependent upon others for delivery.
3. Waiting for specific orders or instructions (a condition usually resulting from insufficient original information or inability to get at foreman, etc.).
4. Absence of operator or assistant.
5. Lights out.
6. Improper temperature
7. Spoiled work in this or other departments (the delay occasioned by the discovery of spoiled work comes properly under this head, but *not* the time consumed on the rejected product, as provided in Figure 51).

Digitized by Google

8. Power off (where practicable, the idle time should be used for machine cleaning).

9. Supplies or equipment exhausted.

10. Cleaning machine.

11. Repairs or local mechanical difficulties occasioning poor action.

THE INTERIOR CONSTRUCTION COMPANY

Daily Report of Teamster_____Date_____191_

	No. Loads	Hours	HAULED FROM	HAULED TO	COMMODITY	RECEIVED BY

Fig. 74.—Daily Time Report. Time Written

Planning Rack

Figure 77 shows the design of a rack devised for the purpose of laying out work for machines and operatives; it is also known as a "jobs-ahead rack" and is arranged by classes of machines, each class being indicated by a flag mounted on a square staff. These staffs are equipped with hooks which fit snugly over the cross-pieces of the rack without further fastening; they are readily adjustable to any position on the rack.

Digitized by Google

The general plan of operation is to have a pocket (Figure 78) numbered for each employee or for each machine desired. These pockets are made of a convenient size to fit the daily time card in use; where the time card is long, for instance as in Figure 64, the cards may be folded. The name and the employee number on the time card should show just above the top of the pocket. The rate is never inserted until the daily time report is turned into the cost office, as workmen are oftentimes bright enough to figure out ciphers and codes used to represent pay rates.

The production orders, preferably like Figure 41, for specific order production, should be kept at or near the planning rack, and the superintendent, foreman, or other person whose duty it is to give out the work scans the production orders at least once each day, but probably oftener, looks over the rack and assigns work enough in advance to keep all operatives busy to the best advantage. As an operation is completed, the coupon for that operation is clipped from the production order tag and sent to the cost department at the end of the day.

The card pocket (Figures 77 and 78) has a numbered "sticker" on it, indicating the man number or the machine number; also it is equipped with a cardholder on the front. On the card contained in this front holder (Figure 79) are shown the order numbers assigned to the operative, and also the standard or allotted time it will take to complete each order. As orders are completed, they are crossed off by a pencil stroke, thus leaving clear what work is ahead of each machine.

The card pockets, or boxes, are adjustable so far as concerns the location upon the rack, and the rack can be

Digitized by Google

The Refractories Corporation
PLANT No. 8

Time Report and Distribution of Labor _____ 191__

ACCT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
H1																		
H2																		
J1																		
J2																		
J3																		
J4																		
J5																		
J6																		
J7																		
K1																		
K2																		
K3																		
K4																		
K5																		
K6																		
K7																		
K8																		
K9																		
K10																		
TOTAL HOURS																		

FIG. 75.—Timekeeper's Sheet (By Processes)

Digitized by Google

THE PEARL BUTTON CO. Earnings of _____ week ended _____ 191_

	1 Size or Grade	2 Amount Given	3 Ret'd Goods	4 Chip	5 Wrong Side	6 Not Deep	7 Crooked Holes	8 Partly Drilled	9 Not Drilled	10 Large Center	11 Small Center	12 Poor	13 Dog-troyed	14 Gross Price	15 Docks	16 Net Price	Inspected by

FIG. 76.—Piecework Record for Premium Docks

Digitized by Google

arranged and rearranged if desired, to suit the convenience of the planner, assigning a given class of work an entire side of the rack or possibly not more than two tiers or banks—a minimum of two because the metal, indicating flag takes up or spreads over the space of two tiers.

Figure 78 shows a detached card pocket, and Figure 79 shows the two cards which are slipped in the front portion of the pocket. The upper card remains permanently with the box or until the box is assigned to another employee or machine number. The lower card is replaced as often as one becomes filled.

In the operation of the planning rack each employee's work is planned ahead so that he may turn directly from one job number to the next, stamping or ringing "stop" on the first job card, or coupon, and ringing "start" at once on the next. There are then no pauses or lost time between the two jobs—a condition desirable not only from the accounting standpoint, but from the standpoint of individual efficiency. If this is not the case, there is idle time between jobs, which is a direct loss to either employer or employee, depending upon the method of labor payment, the employer suffering to some extent in either case.

Mechanical Aids

The daily time report which best fits in with the planning rack under ordinary conditions is shown in Figure 64. Either the coupons can be used on a time recording device, or the time can be filled in by hand, preferably the former; they are not detached as filled, but the strip is taken up at the close of each day by the cost department. Subsequently the coupons are

Digitized by Google

extended by determining the elapsed time, deducting any lost time shown on the top coupon and reducing the net time to a money value, adding all elapsed time to see that the total compares with the total "in" and "out" time. A device has been invented for this purpose which will subtract stopping time from starting time, as shown indiscriminately on any form of time report, and which will determine the elapsed time and multiply it automatically by any desired rate per hour, registering on the coupon the elapsed time and its money value, together with a prorated apportionment of overhead, and accumulating the several values of all such coupons on the strip, transferring a printed total of hours and money values (labor and overhead) to the head of the strip and in addition to this list each calculation on a large sheet similar to that described on pages 168 and 169.

The coupons of the time report sheet are detached from the time report strip by a small shear, such as is used to trim photographs, or a pair of scissors and are filed under the proper number as mentioned on page 168. Finally the stub containing the total time for the day is filed under the workman's number until the pay roll is to be made up, when all the stubs are removed and summarized for the pay roll (Figure 81).

Figure 68 shows a form of perforated card which can be used to advantage with the planning rack. This card is for use in connection with an automatic elapsed time equipment, consisting of two separate devices. What is known as the "shop machine" is a special form of time recorder and will record in plain figures the starting and the stopping time respectively and can accumulate covering a period of a week. In the card shown, the starting and the stopping happen to have been on

Digitized by Google

the same day, March 8, as shown at the bottom of the time registration columns. The small "2" in this case indicates the department number. To find the elapsed time these cards must subsequently be put through what

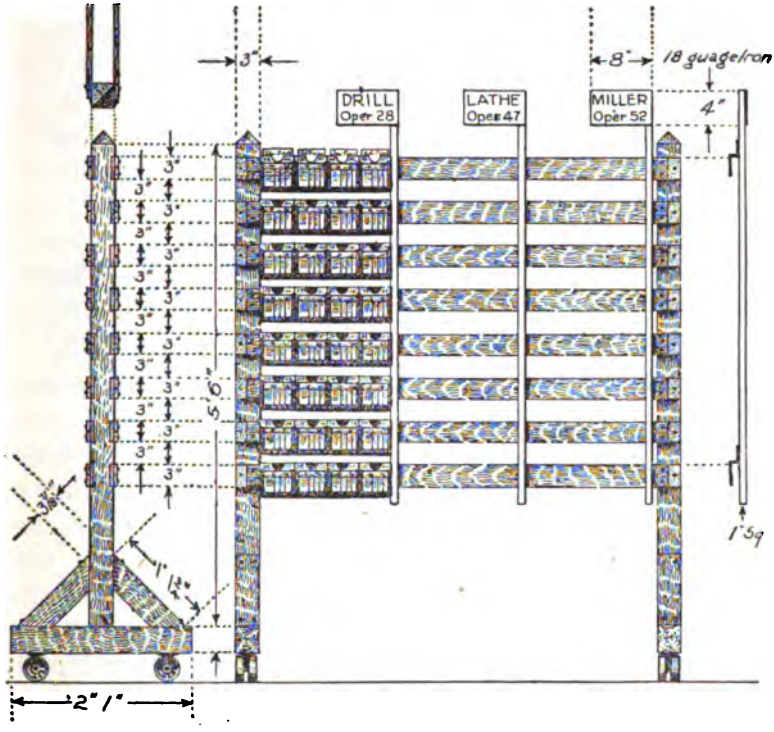


FIG. 77.—Planning Rack

is termed the "office machine," which finds the elapsed time and prints it in plain figures (top and center of card) and simultaneously punches the elapsed time in the "Time" column (at the right hand of card). The data on this card are in connection with Order No. 6432 on Figure 20; where these cards are used, only one posting of each element is necessary on the Production

Digitized by Google

Register in a given month, as the cards can be automatically totaled and the total posted.

As these cards are limited as to space, the columns must be made to tell as much as possible in as little space as possible. At the extreme right column numbers "1" and "2" indicate productive labor (P) and nonproductive labor (NP), respectively. The presence of these symbols makes as few as two columns possible in the "account" field. If the card be "productive," Figures 31, 32, 33, or 34 will answer to indicate respectively, Departments 1, 2, 3, or 4 (Figure 9), and the "overhead" and "labor" on the card can then be properly allocated. If the card be "nonproductive," then figures anywhere between 10 to 26 will be recognized to mean under the 100 group.

The six perforations at the left-hand side of the card (in the handwriting portion) have no accounting significance, but are merely for the "office machine" in determining the elapsed time. This equipment, like a number of other clever, elapsed-time calculators, requires a card especially equipped for it and usually obtainable only from one source, thus narrowing its use by making the system fit the device instead of the device fit gracefully into the needs of the system. In addition, the reduction of the elapsed time to a money value must be independently performed as well as that of the overhead apportionment. An objectionable feature of this device if it is intended to be used over a period of days is that it faithfully calculates during all working hours and, therefore, does not deduct any "in lates" and "out earlies," in which case it appears to be advisable to close each card each day instead of attempting to run one card an entire week. Where it is desired to accumulate time data on one card, Figure 52 used on

Digitized by Google

an ordinary time recorder is much better and can handle "interruptions," "continuations," "resumptions," etc., without confusion, the elapsed-time calculations being performed on the first-mentioned device and the data so found being punched upon a labor card like Figure 69 if an automatic sorting card be desired. Figure 69 represents Order No. 7503 on Figure 20 and is supposed to embody an accumulation of time from a form similar perhaps to Figure 52.

Beyond the automatic feature embodied in the devices used in connection with Figures 35, 36, 37, 68, and 69,

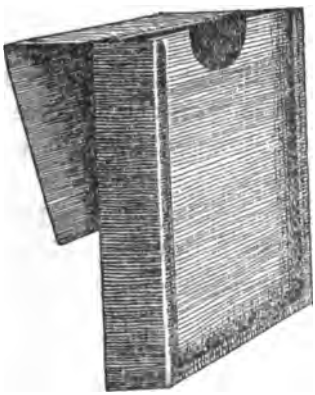


FIG. 78.—Card Pocket

FIG. 79.—Indicator Cards

there have been developed several distinct types of key-operated assorting machines both for numerical and alphabetical assortments. At the present time the former (numerical) are used most largely in railroad accounting, particularly as to waybill data, and the latter (alphabetical) in connection with the exact alphabetical arrangement of names, as for directories. Beyond a doubt these devices will quickly be developed for cost accounting work, holding as they do such possi-

Digitized by Google

bilities of rapid handling of material and labor cards with small cost. The automatic cards, which require preliminary punching, will run through a "sorter" at the rate of 300 cards per minute. The manually operated sorter manipulated by an operator who depresses keys similar to those of an adding machine or a typewriter and who works from original data (made by adding machine, typewriter, pen, or pencil) can assort as fast as the operator can work, the present attained speed being approximately 118 cards per minute.

Pay Summaries

Figure 80 shows a form for recording labor cards, coupons, or other form of time reports on an "unlimited split" duplex machine after the manner described on pages 168 and 169. This purports to be sheet 19 as entered on folio 2 of the General Exhibit (Figure 12), line 22. By reference to Figure 80 the following written totals may be seen, which, summarized for entry in the General Exhibit, appear as follows:

Productive	$9,709.15	
Nonproductive	1,545.35	
Accrued Labor		$11,254.50

This form purports to be for one day's work and, therefore, the total appears to be somewhat large; this, however, is done purposely for reasons assigned on page 80. It is the principle that is here considered rather than the value of the figures in the example. In practice it is not necessary to take a new sheet for each day's listing; on the other hand, the two sides of one sheet might, at times, take the items for an entire week.

Digitized by Google

This sheet properly used in connection with Figure 64 makes it possible to maintain an accurate check on all the coupons of Figure 64 after they have been detached from the strip. Beyond this each adding machine total can be made to serve several purposes if Figure 81 is used in conjunction therewith. A strip of coupons is picked up by the operator, who types in first the "man number." On the next line he types in the first order number, the time, and the value (of the time) and "registers" them, following with each coupon of productive work, "pulling" therefor a "transfer total," which prints the total on the sheet indicated with a "T" and at the same time registers the amount in the "lower counter." Under one plan of handling not illustrated the carriage is then shifted to the "Nonproductive" column, where coupons for indirect labor are listed in like manner as is also the coupon for "delays when under time work." In similar manner a "transfer total" is pulled. When this is done, a total can be pulled for the lower counter and the impression can be made on the back of the top part of Figure 64 by inserting it in front of the sheet, or it can be listed on the sheet and later crossed out or not as desired.

Under the plan of handling shown in Figure 80 all the productive time is typed in before the nonproductive time is listed. Sometimes the clerk makes mental calculations from the total of each employee's productive time immediately after he lists it in order to see that the coupon, or coupons, for nonproductive time equals the full working hours of the plant. In other cases this comparison is made after he has listed all productive time and has gone back over the coupons for nonproductive time. It is always (or should be) compared at one stage or another to see that "the sum of the parts

Digitized by Google

equals the whole." As the "upper counter" is used for accumulating each employee's job items and is "cleared" with each "transfer total," it is, therefore, the "lower counter" which is used for showing the "subtotal" at the bottom of each succeeding column up to the last or grand total. The subtotal is indicated by an "s." When the full total of productive time is registered, it is still "pulled" by means of the subtotal key in order to retain in the adder the means of arriving at the full amount of credit to Accrued Labor Account. When this is done, it is, of course, not possible to take any interim totals under the nonproductive group, but as they are usually quite few in number, an interim total is not necessary.

In Figures 47 and 80 is shown an elongated punch hole; this is intended for use in binders of the flat-band type, which need but very little space at the binding edge and hence do not waste valuable space on the adding machine or adding-typewriter platen. The slot is omitted originally in order to expedite the handling of sheets, this way being very much less subject to the annoyance of punched tabs catching in one another and tearing. When a sheet has been typed, perhaps on both sides, and is ready for the binder, a scissors can handily snip the slot opening where it belongs, as indicated by dotted lines on the binding edge of Figure 80.

Figure 81 represents the master sheet of the pay roll form. Slip sheets can be used with this so long as the employees are not changed too often, the slip sheets being identically the same as the master sheet, save only for the "descriptive" space. The sheet as here shown is for use in the adding machine, but a similar form can be devised for pen and ink or typewriter entries.

Digitized by Google

One plan for Figure 81 is to insert a sheet in the adding machine or adding-typewriter and "line" it to, perhaps, Monday. The daily time report summary (Figure 64) of the first-named man is then typed in the pay-roll form under "Productive" and the carriage shifted to "Nonproductive," using the "upper" counter and the "lower" counter respectively. The reports of the various employees named on the page are then listed in like manner, each subsequent listing being "lined up" or "spotted" by tilting the carriage back and turning the platen to the desired place. When the bottom of a sheet is reached, a subtotal is pulled in the corresponding day in the lowest or total "zone." This operation is carried through to the last sheet, where a complete total is pulled for the day's record. From these two totals a pen or typed summary is made as shown on Figure 80. Under the plan illustrated all productive time is handled first and sheet totals are accumulated by means of transfer totals—then nonproductive is similarly handled. If for a fuller sense of security it is desired to check the grand total, a summation can be made of the totals mentioned as being typed on the back of Figure 64 (or on Figure 80 if not on Figure 64). It is for these reasons that Figure 64 is such a time-saver and at the same time is safeguarded against confusion. While it was not previously explained, these strips of coupons are all supplied upon the reverse with man number and date by means of long strips of rubber stamp numbers. For example, for man number 347 the clerk in preparing the strip for the next day would pick up No. 3 stamp, which would affix a column of three's from top to bottom of the strip; in like manner 4 and 7 would be affixed, making the number appear on each

Digitized by Google

coupon several times and, although "staggered," it would be in sequence and might appear thus:

3	4	7
3	4	7
3	4	7
3	4	7
3	4	7

The day of the month would be affixed in like manner, although in most modern time recorders the date is automatically affixed at the same time the time of day is.

With this information on the coupon and the coupon identified, it is not necessary to write the name or other data upon each coupon, as is necessary where individual cards are used for each job. In any form of pay roll made up from daily time reports or of time reports extending over any portion of a given pay period, there is the probability of a slight variation in the total of the individual extensions as compared to the "over-all" measurement, due to the "give and take" on the fractions of a cent in the various calculations, as may be seen in the following typical list. These can be adjusted by entries in the "Deductions" column of the pay-roll form, using black ink for net "overs" and red ink for net "shorts." In the pay-roll column a grand total will be taken of these and the difference charged or credited, as the case may be, to Over, Short, and Damage Reserve Account (556-557).

Digitized by Google

Progressive Sheet No. 19

Entered Exhibit, Folio 2 Line 22

Labor Cost Summary, Week ended Feb. 16, 1916

Goods in Process			Goods in Process			Goods in Process			Goods in Process			Manufacturing Expense			
Man No. Order No.	Labor Cost	Time	Man No. Order No.	Labor Cost	Time	Man No. Order No.	Labor Cost	Time	Man No. Order No.	Labor Cost	Time	Man No. Order No.	Labor Cost	Time	
127			492			649			841			127	.21	.6	
6241	.67	1.9	6647	1.34	2.8	6321	.48	1.3	6290	.42	1.1	130	8	.2	
6312	.91	2.6	6312	1.49	3.1	6514	.63	1.7	6412	1.10	2.9	132	.11	.3	
6387	.81	2.3	6418	.67	1.4	6297	.89	2.4	6472	.46	1.2	138	2.50	8.0	
6251	.21	.6				6481	.41	1.1	6512	1.06	2.8	155	.14	.3	
				3.50	7.3†	6701	.44	1.2				492	.34	.7	
	2.60	7.4†	493							3.04	8.0†	493	.29	.6	
128			6519	1.01	2.1		2.85	7.7†	842			495	2.50	8.0	
6257	1.42	3.6	6427	1.15	2.4	650			6519	1.06	2.8	527	.16	.4	
6294	1.74	4.4	6308	.91	1.9	6428	1.70	4.6	6584	.87	2.3	528	.28	.7	
			6372	.48	1.0	6492	.78	2.1	6219	1.10	2.9	532	8	.2	
	3.16	8.0†				6647	.48	1.3				649	.11	.3	
129				3.55	7.4†					3.03	8.0†	651	.11	.3	
6314	.96	2.6	494				2.96	8.0†	843			652	8	.2	
6209	1.78	4.8	6428	1.84	4.6	651			6298	.72	1.9	653	4	.1	
6374	.22	.6	6547	1.36	3.4	6380	.89	2.4	6301	.87	2.3	655	.11	.3	
						6392	.67	1.8	6328	.53	1.4	658	.11	.3	
	2.96	8.0†		3.20	8.0†	6521	.48	1.3	6512	.91	2.4	659	2.50	8.0	
						6674	.81	2.2				660	2.00	8.0	
130			495							3.03	8.0†	661	2.50	8.0	
6312	1.62	4.1	6432	1.48	3.7										
6417	.51	1.3	6817	1.51	3.2		2.85	7.7†							
6247	.91	2.3			8.0†	6487	.63	1.7	6490	.46	1.2	683	4	.1	
6519	1.03	2.6	527			6328	.89	2.4	6512	.72	1.9	694	8	.2	
6328	.55	1.4	6528	1.16	2.9	6512	.30	.8	6647	.65	1.7	695	4	.1	
			6419	1.36	3.4				6591	.49	1.3	696	.11	.3	
	3.16	8.0†	6432	.52	1.3		2.96	8.0†	6628	.72	1.9	698	.11	.3	
153						697						847	.11	.3	
6212	.50	1.2		3.04	7.6†	6381	.93	2.5		3.04	8.0†	859	4	.1	
6297	.67	1.6	528			6299	.96	2.6							
6349	1.01	2.4	6432	.76	1.9	6428	1.07	2.9		9,703.15	3,236.8$		1,548.35	527.6†	
6278	.97	2.3	6519	.84	2.1										
6112	.21	.5	6527	.44	1.1		2.96	8.0†		Totals to			Total to		
			6439	.88	2.2	698									
	3.36	8.0†				6329	1.12	3.1		Goods in Process			Mfg. Expense		
155				2.92	7.3†	6372	.65	1.8							
6329	1.76	3.9	532			6528	.50	1.4							
6412	1.71	3.8	6337	1.44	3.6	6416	.50	1.4					11,254.50	3,764.4$	
			6392	1.68	4.2										
	3.47	7.7†					2.77	7.7†							
				3.12	7.8†										
	2,892.15	964.5$		6,649.82	2,216.8$		8,380.19	2,941.1$							

Total Accrued Labor

Machine Sheet

Outside Services after Sales

FIG. 80.—Adding Machine Sheet for Daily Time Reports

Digitized by Google

$3.50 per day of 8 hours is $0.4375 per hour.

Hours	Amount	Over	Short
7.7 =	3.37	$0.00125	
3.8 =	1.66+		$0.00250
2.3 =	1.01—	.00375	
6.8 =	2.98—	.00500	
4.3 =	1.88+		.00125
3.7 =	1.62—	.00125	
3.6 =	1.58—	.00500	
5.5 =	2.41—	.00375	
5.8 =	2.54—	.00250	
2.3 =	1.01—	.00375	
3.2 =	1.40		
3.8 =	1.66+		.00250
	23.12	$0.02625	$0.00625
52.8 =	23.10	.00625	
	.02	$0.02000	

In Figure 67 is shown a small card that accompanies each dozen cut garments in an underwear mill. This constitutes the production order as well and all that is necessary in process work of this kind where the operatives perform their special duties on all garments that come to them in the course of routine. This is somewhat similar in operation to the bag number strips mentioned on page 215. The first operation is listed at the bottom of the card, the second operation next above it, and so on. As will be noticed, a space is left for the operative's check number to the right of the symbol representing the operation. After the check number is inserted, the operative cuts off the coupon to the right and retains it as a pay coupon, i. e., a voucher showing work which has been done for which he is entitled to the compensation printed on the coupon (in cents and fractions). The operatives paste these coupons in books prepared for the purpose, which

Digitized by Google

they turn into the office for pay-roll purposes. To avoid fraud these cards or tags when first issued are stamped the length of the tag with a rubber stamp of peculiar design. This might be employed on the operation strips mentioned on pages 215 and 216.

For the sold-hour and machine-hour pay summaries or pay rolls (Figure 82) where handwriting is used, the form is headed for "direct" and "indirect" time or "chargeable hours" and "nonchargeable hours" as desired, for each separate day of the week, with space provided for weekly summaries of each.

Pay-roll plans other than those mentioned are numerous in form and wide in scope, ranging from simply totals of "in" and "out" time recorded on time recorder cards or "drum sheets" up to finely segregated records on large sheets.

Bonus Earnings

Since the development of scientific management principles and mechanisms of organization, there has been devised a number of different scales of increase in earnings or remuneration based on increased production. What is known as the "differential wage system" consists of an ordinary piece rate for a normal output and a higher piece rate for more than a normal output. The so-called "premium system" pays an hourly rate with extra pay in addition if the work is done in less than a certain standard time. Another system pays an hourly rate and in addition a bonus on every job done within a certain standard time, this bonus being expressed in a percentage of the wages paid.

The basic idea of the "premium system" as it is ordinarily known, is a standard time or rate of produc-

Digitized by Google

tion with a fixed wage or payment for this standard of achievement. If the employee falls short of the standard, he is penalized by deductions from any premium earnings. If he attains the standard, he receives the agreed wage or payment in full but nothing more. If he exceeds the standard, he receives a premium or bonus based upon the excess achievement.

Thus, if the standard time for a certain operation is five hours and the workman by superior concentration, activity, or ability completes the work in four hours, an hour of his time has been saved, and under the plan usually adopted half the price of his hour's work is his. In addition to the saving of time, overhead expenses are likewise saved, but this is not recognized in the employee's compensation and is, in practice, after deducting the cost of operating the system, a gain to the manufacturer.

The various bonus plans are, in the main, modifications of the premium system and provide for a moderate bonus or premium for small time reduction and a graduated increase of bonus as time is further reduced. Thus, one such system or scale provides for a 10 per cent increase of wages for a 10 per cent reduction in time, a 15 per cent increase of wages for a 20 per cent reduction in time, and a 20 per cent increase of wages for a 30 per cent reduction in time, etc. Another system has a standard time established for each job, and during each pay period a record is made of the number of hours worked by each operative on the jobs on which standards were established. Then the total number of hours in which the operatives did these standard jobs is divided into the total sum of the time standards, thereby arriving at a percentage of efficiency. From 66 per cent efficiency (which is allowed .0001 as bonus of wages)

Digitized by Google

up to 90 per cent (which is allowed .10 as bonus) there is a graduated scale of increase. Above 90 per cent efficiency is added the percentage above 90 to 100 per cent, and the sum is the fraction of the wages to be paid as bonus.

The objections to plans of this character are found in the intricacies involved in the calculation of premium or bonus earnings. Clerks competent to calculate premium earnings on a 50 per cent basis are legion, while to follow up the more complicated schemes requires an accountant with some of the qualifications of an insurance actuary. The employees are not themselves usually apt at comprehending the complex slide-rule calculations resulting from these graduated scales of premium, and oftentimes more or less friction results. An old adage reads that "necessity is the mother of invention," which has proved as true in this as in other cases. An instrument has been designed to determine the percentage of elapsed time to standard time and to disclose automatically in Arabic numbers this percentage together with the value of the bonus earnings based on that percentage. This instrument must be specially equipped with whichever scale or system of rates it is to be used under, these scales being interchangeable.

Still another form of the premium or bonus system is based on quality rather than on quantity of work. Such a system may be used advantageously in the making, for instance, of pearl buttons, the work upon which is done on a basis of avoirdupois, that is, a given price per operation per pound of buttons produced. A premium rate of perhaps 50 per cent over the ordinary piecework rate is fixed, but the required standard must be maintained in order to earn the premium rate. A system of "docks" is applied for shortcomings. The

Digitized by Google

nature of these "docks" can be seen by reference to Figure 76, which is an employee's earning record.

To determine the quality of the product and the amount due employees, an inspector takes a carefully weighed ¼-pound sample out of each lot as he comes to it; one sample, as a rule, being all that is taken from a given lot. This sample is carefully scrutinized, graded, and labeled. Any "docks" discovered are listed on the employee's production report and involve a predetermined deduction from the premium rate.

In work of this kind the number of pounds put through a given machine under either the ordinary plan or the premium plan is approximately the same, but the employees become more rapid and more dexterous in feeding the blanks into the various machines. A larger quantity of first-grade product is, therefore, produced with a corresponding reduction of lower-grade buttons and "rejects," which are of little or no value.

Digitized by Google

CHAPTER XVII

EXPENSE (OVERHEAD)

Importance of Proper Distribution

Manufacturing expense is the "bug bear" of the cost finder. It is the great cause of the difficulties, the inaccuracies, and most of the divergencies in both the theory and practice of cost finding. Expense, or overhead, is an important part of manufacturing costs—sometimes by far the greatest part—but it is to a greater or less extent an intangible part, showing in results but not fully seen, always present but difficult to trace, multifarious in its origin but united in one burden on production costs, and ever and always exhibiting an almost unconquerable tendency to swell these costs unduly.

In practice expense, or overhead, is the uncertain element of cost accounting; it is an inevitable incident of production but a most elusive incident, almost impossible of proper determination and distribution unless the plan of accounting be intelligently devised and as intelligently and faithfully carried out.

Of the three elements of production cost, the overhead is unquestionably the most difficult to determine accurately, and even when this is done, the end in view is but half attained. The overhead as determined is still to be applied to the manufactured product so that it will, in connection with the charges for labor and material, disclose the true cost of production.

Digitized by Google

The important part that expense plays in production cost and the necessity for its proper distribution is not always recognized. The cost of labor and materials stands out clearly. Usually such costs are closely coupled with specific order numbers, or with mass product in process, or with departmental costs and are brought into further prominence by clearly defined payments at fixed times. The burden of expense, on the other hand, made up from many varying sources, not clearly seen, indirect in its application, and scattered as to time of payment, is very much more difficult of determination and does not seem so worthy of consideration. Yet the pressure of expense, or overhead, is in many cases the factor that decides the success or failure of an enterprise.

Overhead frequently amounts to 100 per cent, 125 per cent, and even much more of direct labor. It is therefore often actually more important that the proper apportionment of expense should be determined than that the actual labor cost should be correct. If a dime and a quarter are put in a collection basket, it is certainly more important that the quarter should not go astray than that the dime should be carefully looked after.

Cost accounting as a recognized art is hardly a generation old and has had to overcome much shortsightedness and prejudice. Even where methods are not altogether archaic, the accounting system but seldom "measures up" to the possibilities. "Dead time," "nonproductive labor," "a necessary evil," etc., are expressions often used to characterize cost finding work and where used, are generally justified by the results or lack of results obtained from the records. In fact, a more extraordinary jumble of figures having no connection with each

Digitized by Google

< ended November 11, 1916

PUCTIVE Earned	TOTALS FOR WEEK Time	Earned	VARIATIONS Over	Under	DEDUCTIONS Item	Amount	Amount Paid	DENOMINATIONS 10	5	2	1	50	25	10	5	1
13																
10	43 6	14 17														
7	1 4	46														
16	45 –	14 63	✓		Material	235	1228	1	1		1				3	
10																
13	43 7	14 20														
7	1 3	43														
13	45 \	14 63	✓				1463	1	2		1		1		3	
	42 5	14 54														
3																
14	5	17														
	43 –	14 71	09				1462	1	2		1		1		2	
13	44 2	14 59														
3	8	26														
7																
3	45 –	14 85	✓		Cash	500	985		12		1	1	1			
13	44 5	14 47														
3																
	5	16														
	45 –	14 63	✓				1463	1	2		1		1		3	
	45 –	15 75														
	45 –	15 75	✓				1575	1	1				1	1		
	45 9	17 22														
4	1	04														
	46 \	17 26	01				1725	1	1	1	1				1	
	45 6	17 11														
15	4	15														
	46 –	17 26	01				1725	1	1	1					1	
4	45 7	17 34														
8																
	3	12														
	46 \	17 46		02	Handling	200	1548	1	1				1	2	3	
	44 5	18 69														
4																
17	5	21														
	45 \	18 90	✓				1890	1	1	1	1	1	1	1	1	
23 †																
53 †	44 52	158 08			150 64											
25 †					9 25											
60 †	5 8	200			09											
36 †					160 08											
3 †																
200	451 \	160 08	11	02		935	150 64	96	71	16	77	1	1	4		

Roll Master Sheet

Digitized by Google

Digitized by Google

other and no significance in relation to any particular job cannot be found than the so-called "expense accounts" of most manufacturing businesses. Very few persons, even of those who use them daily, realize what they mean practically. No one, commonly, has the least idea how they are likely to be affected by an expansion or shrinkage in the volume of work, and if so affected, what conclusions can be safely drawn from their rise or fall.

There is no excuse for such conditions. Many bankruptcies are the result of ignorance of the real conditions which would have been revealed by the proper distribution of the expense overhead.

Uniformity in Practice

A general uniformity of practice as between different establishments with respect to the relation of expense charges to production costs is very desirable. Thus some concerns charge into manufacturing overhead the item of interest on investment. Others do not. Some concerns charge supplies directly to manufacturing expense without first putting them through the storeroom, even though a large supply is purchased for future use. Others, more properly, charge such supplies to overhead expense only as they are actually used. Similar variations of practice in charging expense costs run through the entire production process.

As one of the consequences of this lack of uniformity concerns manufacturing, similar lines of production cannot compare costs of production intelligently and, in fact, fail dismally when they attempt to do so, because their respective costing charges are not on the same basis. Under such circumstances it is obvious that the

Digitized by Google

production cost of similar goods in these different factories must necessarily vary materially—a condition which leads to puzzling and unwarranted variations in quotations, sometimes very perplexing to competitors and occasionally very disastrous to the quoting concern.

The average manufacturer does not know what his goods cost him. A prominent official of a large corporation is reported as saying that when, before the formation of their combination, he was at the head of an independent factory, he used to wonder sometimes how his competitors could afford to take contracts at the figures they did. When the books of these concerns were opened to his inspection by the consolidation, he discovered that these competitors had never known even approximately the cost of manufacturing their goods and as a result of the system of unintelligent "smearing" of their overhead cost, they had not infrequently taken contracts at an absolute loss.

Expense Diffusion

In determining the expense items properly applicable as factory costs, a sharp line must, of course, be drawn between the two broad classes of expense—manufacturing expense and commercial or selling expense. Items which pertain purely and simply to the sale of product have no place in the cost of production. This is also true of those other commercial expenses which have to do more or less directly with the delivery of the product and with collections such as cash and quantity discounts, crating, hauling, freight on outgoing product, allowances after product has left the factory, etc. Such expenses are a proper charge, direct or indirect, to loss and gain, but not through production, and any

Digitized by Google

attempt to fasten them on production will be a purely arbitrary process, entirely without advantage and entirely destructive of accurate costs.

With a proper segregation of commercial costs and of production costs and with a full knowledge of these latter, a just and proper selling price can readily be determined. Also the proper and economical conduct of the production and the selling departments is greatly facilitated. This cannot be done where the two classes of expense are not clearly separated.

Various methods of distributing expense are in use, differing in principle and involving distinctly different processes in execution. They have been largely devised by men who are engaged or interested in certain lines of manufacture and who have evolved methods suited to the conditions in their own plants or in plants of similar nature. Under such circumstances it is a natural result that there are now various methods of expense diffusion recognized as standard, each of which is suited to certain conditions and entirely inapplicable when these conditions do not exist.

No matter what be the exact method of diffusing the overhead and of determining the precise proportion per unit of production, the fair and just distribution of manufacturing expense over the various departments affected is absolutely necessary to any accurate system of factory accounting. Up to this point all the various classes of production as grouped or classified in Figure 31 are in the same category, without exception or modification.

It will, of course, be recognized that a broad and general apportionment of manufacturing expense as a whole over the various departments is wrong both in theory

Digitized by Google

and practice. The results when this is done do not give information as to the component constituents of cost—one of the most valuable features of a factory accounting system—and do not even show actual costs.

On the other hand, there is no possible way of entirely avoiding a prorating or averaging of expense. No amount of detective work economically possible will trace down and definitely place every item. Each expense should, however, be traced down and segregated so far as possible to the process or product to which it applies. When it can be segregated no further, it must then be averaged over the remaining process or remaining products.

Beyond this there is, of course, in expense apportionment an economically irreducible minimum which cannot be definitely allocated even to groups, and this must be distributed as equitably as may be by averages or arbitrary adjustment over the entire output. The only purpose of making an analysis is to learn how to build up the synthesis.

When the factory conditions are such that there can be no positive line of demarcation between departments, or if machines in operation are so promiscuously intermingled that departmentalizing is a matter of arbitrary adjustment, then presumably the accounting processes will have to adjust themselves to conditions, and expense will be treated in the same arbitrary way. When this is done, the accounting results will naturally show a corresponding lack of sharp definition and accuracy.

The best method of distribution is that which minimizes so far as practical the amount of indirect costs to be diffused on an arbitrary basis—the method which charges the greatest amount of so-called "indirect"

Digitized by Google

expense directly to the product to which it really belongs, provided the system is not carried so far as to be in itself top heavy and economically wasteful.

Under such a system many of the usual overhead expenses become direct, and the department and the product to which they properly belong receive the proper charge, whereas otherwise these expenses must be arbitrarily diffused over all the departments, or when assigned more or less accurately to one department, must be diffused over all the products of that department.

The Labor-Percentage Plan

The departmental segregation of expense is identically the same in principle in any plan of accurate cost finding. When, however, we come to the direct diffusion of expense over product, we find sharply divergent methods. The selection of the particular method will depend to some extent upon physical conditions in the plant and upon the plan of labor records maintained.

Under the percentage plan, the labor cost or the labor and material cost of each job is ascertained, and a certain percentage is added thereto for expense or overhead. This percentage of overhead is either estimated or determined from the records of past performance.

This is a rough and ready means which we have inherited from another age. Under simple conditions where the processes and the products are fairly uniform in character, the loading of expense, or overhead, on the basis of direct productive labor costs is reasonably accurate, but as conditions becomes more complex, the method loses such accuracy as it had until it cannot be safely employed.

Digitized by Google

This method used is largely in groups E, F, G, and H in Figure 31 and is not at all applicable to the "continuous" class of production, with the exception perhaps of some of the industries subsidiary thereto.

When such a method is applied to a shop or a department in the "assembling" class in which large and small machines, cheap and highly paid labor, heavy castings, and small integrants are simultaneously involved, the method is no longer trustworthy. On the contrary, it is absolutely unscientific and unsafe.

The reason for this is found in the varying nature of the charges involved, which cannot properly be taken in bulk and diffused over product equitably on the basis of labor cost. Thus the expense, or overhead must take cognizance of the interest factor, the varying space occupied by different machines, the varying volume of power required to drive these machines, the varying rates of depreciation, the variations of labor efficiency, of supervisory requirements, etc., which bear no direct relation to the cost of labor. The cost of labor is then an absolutely arbitrary basis of distribution, bearing no necessary relation to the expense burden of product and selected as a basis of distribution only because it is convenient. The weight of the product might be taken as a basis of expense distribution with equal logic, and on a simple, unvarying product where expenses run with reasonable uniformity, weight would work as well as would labor cost. There is no reason for selecting either.

The principle of loading overhead on labor cost is based upon the idea that the product increases in value according to the amount of labor added to it and that the greater the amount of labor involved in the manu-

Digitized by Google

facture, the greater the expense required to supervise this labor and conduct the business.

This is true within the narrow confines of its own operation, but it does not cover the whole field. There are other factors in production besides labor, and these frequently predominate. If a manufacturer through competition is forced to reduce costs on a certain article, it would be absurd for him to consider that hiring cheaper workmen would reduce not only labor cost but also overhead as well, as the lowering of labor cost by hiring cheaper workmen would, quite likely, only result in raising the cost at the very point where it would be shown to have decreased.

Cheaper labor, without improved machinery to compensate for any differences, means more spoiled material and fewer units of product per day per operative, both of which factors make for increased total burden rate, and, in the last analysis, the raising of net cost per unit when the total of all units is divided into the total of all production costs.

Viewed from another angle, if the manufacturer is successful in installing efficiency methods to reduce his cost of production and can increase production while even raising wages, it is a foregone conclusion that while the cost per unit of production is perhaps materially reduced, as shown in the following example, yet

Material	$20.00	$25.00
Labor	20.00	21.00
Overhead	20.00	26.00
	$60.00	$72.00
Units produced	100	125
Cost per unit	.60	.576

Digitized by Google

the percentage of overhead to direct labor is very sharply increased by reason of the cost of maintaining the cost and efficiency system, thus making what might appear as an alarming state of affairs when quite the reverse existed.

As a broad example of how little labor cost can be depended on as an equitable basis of loading the overhead cost, unless taken for short periods and under carefully watched conditions, the case of an expert workman working alongside an apprentice may be cited. The latter's skill has perhaps come to equal that of the expert workman, and on certain kinds of work he can turn out as large a volume as the former. Yet there is a wide difference in wage rates, and as a result on a percentage basis the work of the expert is penalized by an overload, while the work of the apprentice is undercharged.

Again in the case of two machines of like character but of different speeds, the one turning out twice as great a volume of product as does the other, we find an equal uncertainty in the diffusion of overhead under the percentage plan. Thus, if the operator of the high-speed machine receives twice the wage paid the operator of the low-speed machine—quite unusual—it will be seen that the expense burden per unit estimated as a percentage of labor cost is the same in either case.

This is obviously incorrect. High production means low overhead, and low production means high overhead. The facts are that while the fast machinery requires more power, it does not require twice as much; nor, within reasonable limitations, is the wear and tear of the rapidly moving machine twice as great as the slower moving machine. These factors are the only

Digitized by Google

Total Dep't Pay Roll $_____ Av'g Pay Roll cost for A___

Total chargeable hours (A)_____ Ratio of B to A_____ %

PAY ROLL _____ Department

For week ended _____ 191__

A indicates chargeable hours; B indicates non-chargeable hours

Clock No.	Name	MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY		Total	Total	Rate	Total Amount	Cost of
		A	B	A	B	A	B	A	B	A	B	A	B	A	B			A

Each Department to be made up separate. Overtime can be recorded on same line with regular time by interlining in red ink.

FIG. 82.—Pay Roll Form. Sold-Hour and Machine-Hour Plans

Digitized by Google

ones disturbed by the increase of speed. The other items in the overhead remain the same, and the overhead rate per unit should then be materially lower for the fast machine than for the slow one. If the labor cost for the fast machine were identical with that of the slow machine, the burden of the expense would be the same in either case, which is obviously incorrect, since the output of the faster machine must stand the added expense of both increased power consumption and increased wear and tear.

It is apparent that there is a point at which wages could be fixed where the expense burden would be properly distributed, but it is equally apparent that any system of expense that requires a wage adjustment in each case for a proper distribution of expense is fundamentally wrong.

The Man-Hour Plan

Under this plan the total number of direct productive hours of labor in each department for each month or cost period is divided into the total amount of the manufacturing overhead in that department for the same period, thereby arriving at a constant per productive hour in each department. Each shop order in process can then, in each successive department, be loaded with an amount of overhead equal to the number of productive hours it has consumed, multiplied by the departmental constant. This differs from the percentage plan in taking the hours of labor instead of the cost of labor as the basis for distribution of expense. Under the man-hour system the cost of labor, from the standpoint of overhead distribution, is of no importance. In

Digitized by Google

other words, the man-hour charge is a time charge without relation to labor cost.

The man-hour plan of distributing manufacturing overhead is much more logical, more generally available, and more accurate than is the percentage plan. Each employee in a factory, whether man, woman, or child, requires the same amount of attention in a general way as does the next one. Each employee must have his place on the pay roll, time reports to be accounted for, a peg or locker for his clothing, toilet facilities, soap, towels, wash water, drinking water, casualty insurance, etc., and it costs no more in one case than in another no matter what the difference in wage rates may be. Also, for all practical purposes each employee takes up an equal amount of factory space physically and, if he be a slow worker, is narrowing the possible volume of output of product of his department even though he be a low-priced man.

By applying a cost per hour for overhead it is, as stated, in effect a time charge—a toll charge for the benefit accruing from the use of the department's conveniences, based, as in the case of the long-distance telephone, on the length of time these conveniences are used and not on the amount of money involved in the operation, as in the case of the telephone in the conversation. The labor hours by which this time is measured is merely a convenient way of arriving at the time the particular job is "on the line."

Where the man-hour plan of distribution is to be employed it should, by all means, be used independently in each individual department. A man-hour constant taken for the factory as a whole is absolutely valueless as far as accurate cost finding is concerned.

Digitized by Google

The logical time for spreading costs by the man-hour plan and the necessary time for exact results is at the close of the month or of the four-week cost period. It frequently happens, however, that production costs are desired before the close of the cost period, and then some slight element of guesswork must enter into the calculations if it be during the first month of installation. Subsequently in a going institution the man-hour rate should at all times be maintained at a fairly close mean average.

As a matter of fact, many factories within the author's knowledge obtain the man-hour constant but four times a year and secure fairly accurate results, especially where the line of product is unvarying. One industry which goes very deeply into cost finding determines and uses each month the average rate for the twelve months last past, thus getting a "constant" embodying all seasonal conditions.

On Figure 20 it may be noticed that both the "cost charges" and the "credits" groups show a column for "elapsed time." By having similar debit and credit (memoranda only) columns for elapsed time in conjunction with Goods in Process, Overhead (controlling) Account, there can always be seen the exact "constant" rate per hour of the net balance of "diffused overhead" still in work.

The Sold-Hour Plan

The method of absorbing the overhead element under the sold-hour plan of cost finding is, to all intents and purposes, similar to that of the man-hour plan, as discussed beginning with page 203. The only practical difference is in the method of applying the expense con-

Digitized by Google

stant. Under the man-hour plan the actual pay-roll cost of the direct producing labor is charged directly to the individual job order numbers to the exact extent of time occupied by workmen on such orders. When this is done, the overhead constant is added to the cost of the job on the basis of the number of productive hours the work has been in process.

The sold-hour plan, on the other hand, contemplates averaging all direct producing labor costs in each department (Figure 82) and arriving at a departmental flat cost per hour, called the "pay-roll hour," to which is added the constant of overhead as described under the man-hour plan, thus arriving at the cost of the sold hour in that department. The charges for product are then the cost of material and the cost of sold hours consumed, with a margin of profit arbitrarily added.

This plan of absorbing the expense constant through the medium of the labor cost is thought by some to be more simple in operation than is the man-hour plan, and possibly it is, where the average hour can be used, as in Figure 31 under Class H. But it would be cumbersome to apply it in any system of costs where hours of many varying labor values are employed.

The Machine-Hour Plan

The characteristic feature of the distribution of expense under the machine-hour plan is the practical elimination of ordinary indirect expense. Every expense is traced down as far as possible and applied directly to product through a gross hourly charge for the machine service. The method somewhat resembles that of the man-hour plan but goes much further into detail, using the individual machine, or groups of machines,

Digitized by Google

as the unit for the distribution of expense, instead of the department, as under the man-hour plan.

A comparison of the machine-hour with the man-hour plan reveals about the same difference in refinement of application as would obtain between a man-hour plan based on the factory as a whole.

Without doubt where it can be used, the modern machine-hour plan is the most scientific and accurate of all methods of diffusing overhead costs, or burden over products. The method is comparatively simple in operation when once properly installed, but on account of a very fine application of costs, its installation is a matter of difficulty, requiring a thorough knowledge of the principles involved and of their proper application.

The List-Percentage Plan

The method of absorbing the expense element under the list-percentage or standard-cost plan varies materially from that of the percentage plan. Instead of a general or fixed percentage upon the value of either of the constituent physical elements, material and labor, the expense, or overhead, is expressed as a percentage, determined by tests, or estimates, or reference to records of past production, of a list price of the different articles of the product involved.

The list-percentage plan involves another feature not characteristic of the ordinary percentage plan; that is, a sharp supervision is kept over the variations for the cost period of the debits and credits to each departmental expense account, with occasional adjustments as needed to allow for and minimize the effect of such variations. Also specific tests are made from time to time to the end that the constituent element of the cost of each

Digitized by Google

article of the product may be kept at a fairly correct percentage of its list price.

On page 187 under the caption "Standard Costs," will be found a further treatment of the general plan. This plan may be found applicable to a greater or less degree to certain lines of product in any of the groups from A to G inclusive, of Figure 31. It serves its fullest usefulness, however, in Groups B, F, and G.

The Process Plan

This method of diffusing or allocating expense, if properly practiced, considers the departmental overhead as the unit, just as do all the other correctly devised expense plans. In Figures 24, 25, and 26 can be seen typical applications of the departmental overhead to the product under the process plan.

The process method is, with proper modifications, applicable to any group under "continuous production" in Figure 31. The precise application is a constant per ton, pound, yard, gallon or, in fact, any unit of weight or measure of solids, liquids, or gases.

Where there are several different grades of mass product passing through the same departmental process but which do not average up well to a common standard, then an adaptation of the point system as described in Chapter XIII beginning with page 207 can be used to advantage. An example of such an industry is a terra cotta works. Here various grades are produced involving a wide difference in process cost per ton of product. Some plain rectangular pieces require little or no designing work and are easy and simple to handle, while as the other extreme may be cited an intricately detailed pattern specially designed for a big building by an

Digitized by Google

artist of high merit and involving workmanship of high order and requiring extremely great care in handling. This latter product while having some processes in common with the simple grades, in so far as cost is concerned, has wide divergences when the loading of overhead is considered. The high-class goods must bear the brunt of the designing cost, else the simpler grades will be heavily penalized and thus destroy the accuracy of the cost statistics.

Digitized by Google

CHAPTER XVIII

EXPENSE ANALYSIS

Analyzing Expense

Expense items for term charges as they accrue should be analyzed from invoices or original entries on an analysis sheet suited to the needs of the particular business. These needs do not vary to any extent in principle but for the most part in size of sheet or number of segregations involved. Figure 83 shows a typical form of Expense Analysis Sheet. In this analysis are included items which are direct charges to departments, and also items which are partially or wholly applicable to administrative or commercial costs.

At times comparatively heavy expenses are incurred applicable to costs, which have not been foreseen and which cannot properly be regarded as capital expenditures and yet which cannot with equity be charged against the expenses of a given cost period. To this class of expenditures belong insurance items paid in advance, interest charges paid before such interest actually accrues (if not handled through account 552, Figure 9), the installation expenses of a cost system, and other professional services, the benefit from which extends over subsequent periods. Office stationery and supplies are frequently put in this same category.

In any such case the item may be charged to the proper account in the "suspense" section of the Private

Digitized by Google

Ledger. From the amount thus established a monthly or periodical apportionment is made by crediting the particular suspense account and charging the proper expense account. (See Figure 9 and corresponding classifications on Figure 83). The monthly amount to be charged from the suspense account rests in the judgment of the management or of the accountant in charge and will under some conditions vary for the different months according to the proportion of benefit received. The whole matter is one that should be governed strictly by the facts; that is, the reservation must be justified and the succeeding periods must be actually benefited by the expenditures to the same degree as is the current period or in proportion to the amount charged to such periods.

In Figure 9, the "suspense account," Group K, is shown as a deferred charge, indicating that these items have no debt-paying qualifications. Such accounts should be kept distinctly separate and apart from other asset accounts in order to avoid misleading impressions.

On the opposite side of the balance sheet shown in Figure 9, under "deferred credits," Group N, is shown a number of so-called "reserves." These differ from the suspense accounts of the preceding section, inasmuch as the expenses they cover are anticipated. They represent items set aside and built up from month to month for some specific purpose or for the meeting of demands accruing as time proceeds and as yet not due and payable. Such demands may perhaps be of an intangible nature as, for instance, where the actual liabilities are being incurred but where the amount of such liabilities cannot be positively measured, weighed, or counted until some future period.

Digitized by Google

Reservations of this kind are made as the occasion arises, and such monthly or periodical amounts are credited to them and charged into costs as may in the judgment of the management seem necessary. If justly determined, they will provide an adequate reserve against which costs of the nature mentioned may properly be charged as they become payable.

The amount of the monthly or periodical credit for such reservations may or may not be sufficient to absorb ultimately all the anticipated costs. If the credit actually made proves to be insufficient, the account called "Factor of Safety" (N 560) may be called upon to absorb the difference.

The Factor of Safety Account, as its name indicates, is a general reservation to cover unforseen contingencies. The account should not be used to establish a secret reserve with which balance sheet figures may be manipulated, but should be honestly confined to such amount as is conservatively estimated will cover the probable demands upon it. This is, of course, purely a matter of estimate, and if at the close of a fiscal period the balance of the Factor of Safety Account is found to be unreasonably large, a portion or all the balance may be absorbed into the Profit and Loss Account.

Expense Summaries

In Figure 83 the extreme right-hand column is devoted to summaries of various kinds. Periodical apportionments from reserve and suspense accounts having but one item each month for each account do not need a a larger space such as is given to those accounts having a number of entries; hence they are "bunched."

Under the heading "Summaries—Manufacturing and

Digitized by Google

Administrative" are listed all the totals in the various distributing accounts; below this is a grand total which is made up of the following:

Reserves for Maintenance, etc.	$ 9,584.25
Reserves for Depreciation	2,407.00
Items from Suspense	355.00
Administrative Summary	3,224.41
Manufacturing Summary	12,731.30
	$28,301.96

By referring to General Exhibit, folio 3 (Figure 15), line 25, it may be seen that this amount is in exact articulation with the "Accruing Manufacturing Expense" column.

The various entries on the Expense Analysis were collated from different sources. In posting the items from the various sources it is a help to use a different colored ink for the postings from each book of original entry, and if the analysis sheet is out of accord with the controlling record, the postings from one book at a time can be reconciled until the error is located.

The following list represents the source and the amounts of all items analyzed on the Expense Analysis Sheet. Some items are purely hypothetical, and some are taken from existing forms as indicated.

EXPENSE ANALYSIS

Exhibit, folio 2, line 6	(Hypothetical)		
Check Register, sheet 1	101	$ 12.75	
	102	9.35	
	104	18.07	
	110	6.95	
	115	5.25	
	189	15.00	
	190	1.77	$ 69.14

Digitized by Google

Exhibit, folio 2, line 9	(See Figure 19)			
Purchase Analysis,	103	$ 3.80		
sheet 14	137	1.65		
	145	9.27		
	182	50.00		
	184	3.40		
	186	75.00		
	187	9.50		
	141	109.25		
	130	26.90		
	136	3.50	$ 292.27	
	(Hypothetical)			
	114	$ 292.50		
	115	275.00		
	116	237.50		
	117	275.00		
	118	298.50		
	119	162.75		
	120	76.40		
	121	92.50		
	122	210.40		
	123	240.25		
	124	316.12		
	125	160.00		
	126	290.00	2,926.92	3,219.19
Exhibit, folio 2, line 11	(See Figure 17)			
Check Register, sheet 3	111	$ 500.00		
	112	615.00		
	113	365.00		
	180	900.00		
	181	433.00		
	139	50.00		
	186	100.00		
	138	6.00		
	187	250.00		3,219.00
Exhibit, folio 2, pencil footings under line 21				$ 6,507.33
Exhibit, folio 2, line 22	(See Figure 80)			
Labor Cost Summary,	114	$ 176.25		
sheet 19	115	167.50		
	116	115.10		
	117	140.25		

Digitized by Google

	118	186.90	
	119	85.25	
	120	43.25	
	121	45.10	
	122	108.20	
	123	120.19	
	124	149.91	
	125	90.75	
	126	116.70	1,545.35
Exhibit, folio 2, line 26	(See Figure 16)		
Cash Receipts, sheet 3	188	$ 500.00	
	216	*Cr. $ .30*	
	223	*Cr. 3.75*	*4.05* 495.95
Exhibit, folio 2, line 28	(See Figure 47)		
Material Cost Summary page 16	112	$ 12.40	
	112	3.75	
	118	92.95	
	119	8.45	
	120	164.19	
	121	210.70	
	122	140.90	
	126	190.25	
	138	42.70	
	150	28.40	
	151	32.69	
	152	34.76	962.14
Exhibit, folio 2, footing at bottom of column			$9,510.77
Exhibit, folio 3, line 5	(Hypothetical)		
Purchase Analysis, sheet 15	101	$ 68.40	
	102	18.45	
	104	64.80	
	110	16.20	
	112	14.25	
	114	16.20	
	115	235.80	
	116	80.45	
	117	1.90	
	118	193.84	
	119	16.84	
	124	16.45	
	131	225.00	

Digitized by Google

	132	64.28		
	133	529.94	1,562.80	
Purchase Analysis, sheet 16	182	$ 50.00		
	183	318.75		
	187	75.00		
	188	128.92		
	189	125.00		
	190	60.75		
	191	28.32		
	101	8.40		
	103	90.75		
	104	20.90		
	110	12.75		
	112	17.40		
	113	28.70		
	115	12.40		
	116	21.90		
	117	18.16		
	118	2.80		
	134	375.00		
	136	12.80		
	137	28.19	1,436.89	
Purchase Analysis, sheet 17	115	$1,290.25		
	116	116.50		
	124	120.90		
	137	119.80		
	138	28,90		
	139	240.00		
	150	625.00		
	151	147.19		
	151	260.18		
	152	14.60		
	152	16.09		
	152	168.09		
	184	68.15		
	184	31.85	3,247.50	6,247.19
Exhibit, folio 3, line 6	(Hypothetical)			
Return Purchase, sheet 19	115	$ 128.40		
	124	61.24		
	137	60.20		*Cr.* 249.84

Digitized by Google

Exhibit, folio 3, line 7	(Hypothetical)			
Material Summary,	136	$ 62.10		
sheet 23	137	65.09		127.19
Exhibit, folio 3, line 9	(Hypothetical)			
Production Register,				
sheet 95	140	$ 172.80		
Production Register,				
sheet 96	140	147.60		320.40
Exhibit, folio 3, lines 10 to 21 inclusive, original entries				
Suspense Items			$ 355.00	
Maintenance, etc.			9,584.25	
Depreciation			2,407.00	12,346.25
See Figure 15, line 25				$28,301.96

Commercial Costs

The commercial costs on the Expense Analysis (Figure 83) are summarized as follows:

Periodical Apportionments	$ 1,259.75
Commercial Summary	11,366.18
Apportionment from the Expense Distribution Sheet	3,660.82
	$16,286.75

By referring to Figure 15, line 26, it may be seen that the total amount is in exact articulation with the total of the "Commercial Cost" column. The items which go to make up this summary are shown in the following tabulation. Inasmuch as all commercial costs are in the 700 group, it is not necessary to show more than the units and items of the number when used in the commercial costs columns.

Digitized by Google

Exhibit, folio 2, line 2, original entry 704		$ .90
" " " 5, " " 704		.65
" " " 9, (See Figure 16)		
Purchase Analysis, sheet 14 702	$ 50.00	
710	92.50	
712	219.20	
710	215.00	
710	68.50	$645.20
Exhibit, folio 2, line 11 (See Figure 17)		
Check Register, sheet 3, original entry 700		$ 627.19
Exhibit, folio 2, line 13, original entry 712		127.19
" " " 15, " " 704		1.40
" " " 21, " " 705	*Cr.*	.92
" " pencil footings under line 21		$ 1,401.61
" " line 22, original entry 704		1.65
" " " 26, (See Figure 16) 712		44.81
Cash Receipts, sheet 3—discount column 704		226.09
Exhibit, folio 2, line 27, original entry 704		.20
" " " 29 (hypothetical)		
Cash Receipts, sheet 4—discount column 704		142.12
Exhibit, folio 2, footing at bottom of column		$ 1,816.48
Exhibit, folio 3, line 5 (hypothetical)		
Purchase Summary, sheet 18 708	$500.00	
710	315.68	
708	250.00	
714	16.25	
708	192.40	
712	328.90	
702	17.25	
714	36.32	
708	250.00	1,906.80
Exhibit, folio 3, line 12, original entry, suspense		500.00
" " " 23, " " reserve		759.75
" " " 24, " " 700		7,642.90
		$12,625.93
Transferred from Expense Distribution (Figure 84)		3,660.82
See Figure 15, line 26		$16,286.75

Digitized by Google

Departmental Distribution of Expense

Manufacturing expense is first segregated under its various headings as has been previously described. When this is done, the amount under each heading is distributed in proper proportion over the departments to which it belongs. This is readily accomplished by means of the distribution sheet shown in Figure 84. In practice such a form is ruled with such number of columns as may be necessary for the particular establishment or distribution.

The first column of the distribution sheet ("Suspense and Reserve—Cr.") shows the various items of suspense and reserve and agrees with the following totals in Figure 83:

Reserve for Maintenance	$ 9,584.25
Reserve for Depreciation	2,407.00
Items from Suspense	355.00
	$12,346.25

The second column of the distribution sheet ("Manufacturing Expense Analysis—Cr.") shows the totals of the various expense items to be distributed and agrees with the following totals in Figure 83:

Administrative	$ 3,224.41
Manufacturing	12,731.30
	$15,955.71

The grand total of these two summaries equals $28,301.96, as may be seen in both Figures 83 and 84:

The other columns are debit columns and embrace a group of accounting classifications as follows:

Digitized by Google

Suspense Debit.
Reserve Debit.
Assets Debit.
Commercial Costs Debit.

Also there are columns for direct producing departments 1 to 4 inclusive and indirect producing departments 10 to 19 inclusive. As the items of expense are distributed, the amount belonging to each department or group of accounts is entered in the column designated. The amounts entered in the various debit columns must, of course, equal the total of the two credit columns, and no permanent entries or applications of the figures of the distribution sheet should be made until the accuracy of the distribution has been proved.

The basis of distribution between departments must necessarily differ according to the nature of the expense classification employed. In Groups E and F of Figure 9 a list of the usual expense items will be found. This list is general and without specific reference to any given line or class of product. If this list were to be used in any particular factory, specific items of expense peculiar to that factory would be added or may be substituted for other items in Group E or F having similar characteristics but not found in the particular business.

Items 1 to 19 of Group E are for direct charges to direct and indirect producing departments, i. e., charges arising in such departments and not applying in any way to other departments and, therefore, needing no further departmental segregation.

Items 20 to 62 of Group E are for various items of expense applicable in a greater or less degree to the direct and indirect producing departments. At this point is the crux of the cost finding search. Each

Digitized by Google

department should be charged with exactly what it gets or receives benefit from—no more—no less. In practice each of these various classes of expense is carefully considered, and a "key chart" is filled out for use perhaps for the entire fiscal year. These are changed from time to time if actual physical conditions change. The various angles to be considered in the matter when a "key" is first being prepared makes it quite difficult of accurate determination unless deep thought and concentration are applied. The Expense Account has been in other years, and unfortunately still is to a too great extent, one of those general accounts which are abused and utilized as dumps for inefficiency or indifference, and which, therefore, need frequent and careful scrutiny.

There is no fixed single standard of segregation for all items alike, and each must be treated on the most logical basis that may be evolved. Rent or its equivalent is distributed over the various departments on the basis of space occupied. When power is purchased, its cost is distributed equitably on the basis of horse power used by each department. When power is generated, the power plant is preferably treated as a separate and distinct department, to be diffused as a whole by horse-power units. If gas or electric current is purchased for lighting purposes, the charge is spread over departments on a basis of benefits derived. In cases where the factory generates its own electric current, the cost of lighting, as accurately as can be ascertained, will be separated from that of power and spread over the various departments, as in the case of current purchased. Taxes and insurance are spread on the basis of amounts invested in the various departments. And thus each class of expense is judged squarely upon its own standards.

Digitized by Google

bu-
nat
rst
lly
ld-
the
be
ged
it.
on
res
the
er,
res

1.92
2.77
5.61
1.03
2.51
3.84

8.98
2.24
6.97
10.45
38.31
31.35
48.30

Digitized by Google

3

d
o
e
si
f
t
o
is
d
a
y
o
iz
th

al
lo
is
ba
its
p
er
ar
by
ch
de
wh
co
be
va
ch
of
th
ow

Digitized by Google

The following list shows the basis used for distribution of the items 20 to 62. It may be noticed that charges are made to reserve accounts which may at first seem confusing. The reserve items which are actually absorbed into costs are those like "maintenance of buildings" (50); this is an anticipated cost, and when the actual cost, or any part of it, is incurred, it must not be again absorbed in expense, but it should be charged against that credit which has been set up to receive it. Here is another reason for summarizing reserves on Figures 83 and 84. As all actual expense expenditures whether direct or against reserves, are put through the Manufacturing Expense Account, it is a simple matter, for statistical purposes, to arrive at actual expenditures by deducting the total of the reserve summary.

Expense Distribution

120 Carpenters			
Reserve for Maintenance of Buildings	50%	=	$141.92
Dept. 1	4.5	=	12.77
" 2	5.5	=	15.61
" 3	21.5	=	61.03
" 4	18.5	=	52.51
	100%	=	$283.84
121 Painters			
Maintenance of Buildings	60%	=	$208.98
" " Equipment	15	=	52.24
Dept. 1	2	=	6.97
" 2	3	=	10.45
" 3	11	=	38.31
" 4	9	=	31.35
	100%	=	$348.30

Digitized by Google

122 Millwrights

Maintenance of Buildings	5%	=	$ 22.98
" " Machinery	60	=	275.70
" " Equipment	35	=	160.82
	100%	=	$459.50

123 Porters and Messengers

Commercial	5%	=	$ 17.84
Dept. 1	8.5	=	30.32
" 2	19	=	67.77
" 3	22.5	=	80.25
" 4	15	=	53.50
" 10	3	=	10.70
" 11	5	=	17.84
" 13	2	=	7.13
" 14	6	=	21.40
" 15	3	=	10.70
" 16	2	=	7.14
" 17	3	=	10.70
" 18	3	=	10.70
" 19	3	=	10.70
	100%	=	$356.69

124 Local Transport

Commercial	5%	=	$ 27.12
Dept. 1	16	=	86.75
" 2	9	=	48.79
" 3	31.5	=	170.75
" 4	16.5	=	89.46
" 14	9	=	48.79
" 15	8	=	43.36
" 19	5	=	27.12
	100%	=	$542.14

125 Elevator Men

Commercial	5%	=	$ 12.54
Dept. 1	3.5	=	8.78
" 2	18	=	45.14
" 3	19.6	=	49.15
" 4	21.5	=	53.91
" 11	2	=	5.01
" 12	3.5	=	8.78

Digitized by Google

Dept. 13	2	=	5.01
" 14	6.5	=	16.30
" 16	3	=	7.52
" 17	4	=	10.03
" 18	3	=	7.52
" 19	8.4	=	21.06
	100%	=	$250.75

126 Electricians

Reserves (562-152)	24%	=	$143.26
Commercial	3	=	17.91
Dept. 1	6	=	35.82
" 2	9	=	53.73
" 3	27	=	161.17
" 4	8	=	47.76
" 10	3	=	17.91
" 11	1	=	5.97
" 12	2	=	11.94
" 13	1	=	5.97
" 14	2	=	11.94
" 15	2	=	11.94
" 16	4.5	=	26.86
" 17	1	=	5.97
" 18	4.5	=	26.86
" 19	2	=	11.94
	100%	=	$596.95

130 Water (For boiler, sprinkling, drinking, and washing)

Dept. 10	25%	=	$ 6.72
" 15	75	=	20.18
	100%	=	$ 26.90

131 Heat

Commercial	8%	=	$ 18.00
Dept. 1	6	=	13.50
" 2	9	=	20.25
" 3	24	=	54.00
" 4	20.5	=	46.13
" 11	2	=	4.50
" 12	3	=	6.75
" 13	3	=	6.75
" 14	4.5	=	10.12

Digitized by Google

Dept. 15	3	=	6.75
" 16	5	=	11.25
" 17	3	=	6.75
" 18	5	=	11.25
" 19	4	=	9.00
	100%	=	$225.00

132 Light (By count of lamps used)

Commercial	7%	=	$ 4.50
Dept. 1	5.5	=	3.54
" 2	11	=	7.07
" 3	18.5	=	11.89
" 4	15	=	9.64
" 10	5.5	=	3.54
" 11	2	=	1.28
" 12	3	=	1.93
" 13	2	=	1.28
" 14	8	=	5.14
" 15	2	=	1.29
" 16	4	=	2.57
" 17	3	=	1.93
" 18	6.5	=	4.18
" 19	7	=	4.50
	100%	=	$ 64.28

133 Taxes

Dept. 1	10%	=	$ 65.00
" 2	15	=	97.50
" 3	20	=	130.00
" 4	5	=	32.50
" 10	30	=	195.00
" 14	8	=	52.00
" 15	8	=	52.00
" 16	2	=	13.00
" 18	2	=	13.00
	100%	=	$650.00

134 Insurance

Dept. 1	9%	=	$ 16.20
" 2	7.5	=	13.50
" 3	10	=	18.00
" 4	3.5	=	6.30
" 10	40	=	72.00

Digitized by Google

Dept. 14	10	=	18.00
" 15	8	=	14.40
" 16	4	=	7.20
" 18	5	=	9.00
" 19	3	=	5.40
	100%	=	$180.00

135 Interest

Commercial	18%	=	$1,158.17
Dept. 1	7.5	=	482.56
" 2	6.5	=	418.23
" 3	10	=	643.43
" 4	4	=	257.37
" 10	26	=	1,672.90
" 14	8.5	=	546.91
" 15	11	=	707.77
" 16	3	=	193.03
" 18	3.5	=	225.19
" 19	2	=	128.69
	100%	=	$6,434.25

136 Oil and Waste

Dept. 1	8%	=	$ 6.27
" 2	22	=	17.25
" 3	31	=	24.30
" 4	27	=	21.17
" 15	5	=	3.92
" 18	3	=	2.35
" 19	4	=	3.14
	100%	=	$ 78.40

137 Factory Supplies

Dept. 1	11%	=	$ 21.69
" 2	20	=	39.45
" 3	30	=	59.17
" 4	25	=	49.30
" 15	4	=	7.89
" 16	4	=	7.89
" 18	4	=	7.89
" 19	2	=	3.95
	100%	=	$197.23

Digitized by Google

138 Technical Library

Commercial	17%	=	$ 5.93
Dept. 1	5	=	1.74
" 2	10	=	3.49
" 3	18	=	6.28
" 4	14	=	4.89
" 11	5	=	1.74
" 12	10	=	3.49
" 13	2	=	.70
" 14	3	=	1.05
" 15	3	=	1.05
" 16	3	=	1.05
" 17	3	=	1.05
" 18	5	=	1.74
" 19	2	=	.70
	100%	=	$ 34.90

139 Association Costs

Commercial	15%	=	$ 43.50
Dept. 1	7	=	20.30
" 2	11	=	31.90
" 3	15	=	43.50
" 4	12	=	34.80
" 11	10	=	29.00
" 12	10	=	29.00
" 13	8	=	23.20
" 14	2	=	5.80
" 15	2	=	5.80
" 16	2	=	5.80
" 17	2	=	5.80
" 18	2	=	5.80
" 19	2	=	5.80
	100%	=	$290.00

140 Experimental Work

Commercial	50%	=	$250.00
Dept. 1	5	=	25.00
" 2	11	=	55.00
" 3	22	=	110.00
" 4	12	=	60.00
	100%	=	$500.00

Digitized by Google

141 Incoming Transportation

Commercial	25%	=	$ 27.31
Dept. 13	10	=	10.93
" 14	65	=	71.01
	100%	=	$109.25

142 Over, Short & Damage

Dept. 1	10%	=	$ 25.00
" 2	20	=	50.00
" 3	45	=	112.50
" 4	15	=	37.50
" 16	5	=	12.50
" 18	5	=	12.50
	100%	=	$250.00

143 Variation of Weights and Measures

All to Dept. 14	100%	=	$250.00

144 Factor of Safety

Dept. 1	8.3%	=	$ 41.50
" 2	22.3	=	111.50
" 3	41.6	=	208.00
" 4	27.8	=	139.00
	100%	=	$500.00

145 Miscellaneous

Dept. 1	10%	=	$ .93
" 2	20	=	1.85
" 3	40	=	3.71
" 4	30	=	2.78
	100%	=	$ 9.27

150 Maintenance of Buildings

All to Dept. 10	100%	=	$200.00

151 Maintenance of Machinery

Dept. 1	15%	=	$ 75.00
" 2	16	=	80.00
" 3	30	=	150.00
" 4	8	=	40.00
" 15	20	=	100.00
" 16	4	=	20.00

Digitized by Google

Dept. 18	5	=	25.00
" 19	2	=	10.00
	100%	=	$500.00

152 Maintenance of Equipment

Commercial	8%	=	$ 24.00
Dept. 1	15	=	45.00
" 2	15	=	45.00
" 3	20	=	60.00
" 4	5	=	15.00
" 10	9	=	27.00
" 14	5	=	15.00
" 15	8	=	24.00
" 16	5	=	15.00
" 18	5	=	15.00
" 19	5	=	15.00
	100%	=	$300.00

160 Depreciation of Buildings

All to Dept. 10	100%	=	$500.00

161 Depreciation of Machinery

Dept. 1	15%	=	$187.50
" 2	16	=	200.00
" 3	30	=	375.00
" 4	8	=	100.00
" 15	20	=	250.00
" 16	4	=	50.00
" 18	5	=	62.50
" 19	2	=	25.00
	100%	=	$1,250.00

162 Depreciation of Equipment

Commercial	8%	=	$ 52.56
Dept. 1	15	=	98.55
" 2	15	=	98.55
" 3	20	=	131.40
" 4	5	=	32.85
" 10	9	=	59.13
" 14	5	=	32.85
" 15	8	=	52.56
" 16	5	=	32.85

Digitized by Google

Dept. 18	5	=	32.85
" 19	5	=	32.85
	100%	=	$657.00

Administrative Costs

No business can succeed without an executive organization, and the measure of its success is largely determined by the ability of its executive force. The costs of this executive organization come under the head of pro rata expenses, i. e., items of cost which enter into both the manufacturing and commercial ends of the business. At times the administrative costs belonging to the two classes are readily differentiated, and when this is the case, the accounts capable of this closer classification may be eliminated from the pro rata group.

Local conditions must govern the division of administrative expense as between manufacturing and selling. When the factory plant is entirely separated from the general office or commercial headquarters and when the concern maintains a factory office with its own separate organization, then the prorating operation is a clean-cut one. Where the business is largely run from one general office, the division is not so simple and is to be determined by good judgment and local conditions. As a rule, the largest part of executive costs is commercial and not properly chargeable to production costs.

Executive costs which properly belong to production are spread over departments on the basis of hours in each department as compared with the total hours in the plant or any equitable plan which seems fitting in the individual case.

Following is the list of percentages used in connection with Figure 84:

Digitized by Google

PROPORTION OF ADMINISTRATIVE (80-91)

Suspense			$ 103.40
Commercial	50%	=	1,648.00
Dept. 1	3	=	98.88
" 2	5	=	164.80
" 3	8.5	=	280.17
" 4	6.5	=	214.24
" 10	2.5	=	82.40
" 11	4	=	131.84
" 12	3	=	98.88
" 13	5	=	164.80
" 14	2	=	65.92
" 15	2.5	=	82.40
" 16	2	=	65.92
" 17	2	=	65.92
" 18	3	=	98.88
" 19	1	=	32.96
	100%	=	$3,296.01

INDIRECT PRODUCING DEPARTMENTS

When all items of expense have been allocated to departments, then the cost of the indirect production departments must be absorbed into production through the direct production departments. The same general rules apply to this formality as though the several items involved were purchased outside the plant and are, therefore, handled as described under the heading "Departmental Distribution of Expense" (page 326), save only that distribution is confined to the direct production departments. The percentage will be made as close to actual facts as may be determined.

Following is a list showing the distribution as carried out on Figure 84:

110 Plant Factor, $2,883.20

Dept. 1	9%	=	$ 259.49

Digitized by Google

Dept. 2	11	=	317.15
" 3	43	=	1,239.78
" 4	37	=	1,066.78
	100%	=	$2,883.20

111 Works Management, $714.58

Dept. 1	8.3%	=	$ 59.31
" 2	22.3	=	159.35
" 3	41.6	=	297.26
" 4	27.8	=	198.66
	100 %	=	$ 714.58

112 Engineering, $806.17

Commercial	40%	=	$ 322.47
Dept. 1	20	=	161.23
" 2	10	=	80.62
" 3	20	=	161.23
" 4	10	=	80.62
	100%	=	$ 806.17

113 Purchasing, $619.47

Commercial	5%	=	$ 30.97
Dept. 1	30	=	185.84
" 2	15	=	92.92
" 3	40	=	247.79
" 4	10	=	61.97
	100%	=	$ 619.47

114 Stores and Stocks, $1,657.18

Dept. 1	20%	=	$ 331.44
" 2	15	=	248.57
" 3	45	=	745.73
" 4	20	=	331.44
	100%	=	$1,657.18

115 Power, $3,253.81

Dept. 1	5%	=	$ 162.69
" 2	22	=	715.84
" 3	55	=	1,789.60
" 4	5	=	162.69

Digitized by Google

Dept. 16	5	=	162.69
" 18	5	=	162.69
" 19	3	=	97.61
	100%	=	$3,253.81

116 Patterns, $1,213.42

Reserve for Maintenance (562-152)	30%	=	$ 364.03
Assets	70	=	849.39
	100%	=	$1,213.42

117 Time and Cost, $543.46

Dept. 1	10%	=	$ 54.35
" 2	15	=	81.52
" 3	55	=	298.90
" 4	20	=	108.69
	100%	=	$ 543.46

118 Tool Making & Repairing, $1,509.89

Reserve for Maintenance (562-152)	40%	=	$ 905.93
Assets	60	=	603.96
	100%	=	$1,509.89

119 Test and Inspection, $718.71

Dept. 1	5%	=	$ 35.93
" 2	15	=	107.81
" 3	20	=	143.74
" 4	60	=	431.23
	100%	=	$ 718.71

Closing Entries

When all the transfers as described have been duly performed, the overhead will have been focused down to eight items as shown in the following list and as may be found in Figure 84. These items are duly transferred to the closing folio of the General Exhibit (Figure 15) on line 25.

Digitized by Google

Digitized by Google

34C

116

117

118

119

pe
to
be
fe:
ur

Digitized by Google

Expense Distribution

Suspense	$ 478.40	.018
Reserves	4,453.20	.157
Assets	1,453.35	.051
Commercial	3,660.82	.129
Dept. 1	2,749.40	.097
" 2	3,528.41	.125
" 3	8,000.59	.283
" 4	3,977.79	.14
	$28,301.96	100%

Digitized by Google

Digitized by Google

INDEX

Accommodation checks, 118
Active assets, 58, 72-75
Administrative costs, 337-38
Analysis
  of a business, 60-61
  of expense, 317-41, *insert between* 328 and 329
  of organization, 1-12
  of purchases, 86, 136-37, 146-51
  of subsidiary records, 130-33
Analytic manufacturing, 227-29
Antecedent assembling preparation, 229-33
Articulation, 46-47
Assembling industry, 224, 229-37
Assets
  active, 58, 72-75
  fixed, 59, 77
  intangible, 59
  liquid, 4, 58
  material, 238-39
  passive, 58-59, 75-77
  representative, 59, 77

Bags, in block system, 215-17
Balance sheet, 67-71
Balance Sheet Ledger. *See* General Exhibit.
Bank accounts, 121, 123-25, 133-40
Bill of material, 174, 266
Block system, 124, 214-17
Bonds, 59-60
Bonus earnings, 295-98
Budget system, 217-21
Burden. *See* Expense.
By-products, 225-26, 228-29

Capital liabilities, 60
Cash
  Account, 115-40
  current, 81-83
  importance of, 4
  Journal. *See* General Exhibit.
  Receipts Sheets, *insert between* 78 and 79, 119, 122-33, 135
  the result of production, 2
Channels of industrial management, *insert between* 2 and 3
Charges, deferred, 59, 77, 108, 317-18
Charts of organization, 32-45
Check Register, *insert between* 80 and 81, 83, 85-86, 119, 131-40, 150
Classification
  of accounts, *insert between* 52 and 53, 57-64
  of industries, 128, 222-37
  of labor, 195-97
  See also Analysis.
Closing period, 61
Closing the General Exhibit, *insert between* 76 and 77, 102-14, 340-41
Code numbers, 63-64, 254
Commercial expense, 302-3, 324-25
Committee organization, 27
Comptroller, 35-37
Continuous manufacturing, 222-29
Control, executive, 4-5, 25-45. *See also* Organization.
Controlling accounts, 46-64. *See also* Factory Accounting, General Exhibit.
Controlling records
  Cash Account, 115-40
  controlling accounts, 46-64
  convergent methods, 202-21
  General Exhibit, 65-114
  process production, 181-201
  purchases, 141-57
  specific order production, 158-80
Cost accounting, importance of, 2-5. *See also* Factory accounting.
Costs
  block system, 214-17
  budget system, 217-21
  charged against departments, 184-87
  elements of, 7-9
  machine-hour plan, 202-7
  of production, 62-63, 158-237. *See also* Factory accounting.
  point system, 207-12
  sheet system, 212-14
  sold-hour plan, 203-7
  standard, 187-91
  See also Expense; Factory accounting; Labor; Material; Purchases.
Cost sheets, 164
Credits, deferred, 60, 108, 318-19
Current
  cash 81-83
  Exhibit entries, *insert between* 66 and 67, 80-101
Customers accounts, 73-75

Daily
  Exhibit. *See* General Exhibit.
  report, 74, 99-101
  routine orders, 193
Defective work report, 196, 269-70
Deferred charges, 59, 77, 108, 317-18
Deferred credits, 60, 108, 318-19
Departmental
  accounts, 184-87
  burden, 7-8, 303-16, 326-41
  inventory, 190, 243
  order numbers, 192-93
Differential wage system, 295
Diffusion of expense, 7-8, 109, 161, 302-16, 326-41, *insert between* 340 and 341

Digitized by Google

Economic accounts, 58, 60-63
Efficiency
  defined, 10-11
  requirements, 27-28
Elements of production, 1-3, 238-341
"Estimate and test" plan, 161-62
Exchequer accounts, 81-85
Executive committee, 27, 38-39
Executive control, 4-5, 25-45
Exhibit, general. *See* General Exhibit.
Expense, commercial, 302-3, 324-25
  diffusion of, 7-8, 109, 161, 299-341
  entries of, 108-9
  manufacturing, definition of, 1-2, 302-3

Factory accounting
  Cash Account, 115-40
  closing the General Exhibit, 102-14, 340-41
  controlling accounts, 46-64
  controlling records, 46-221
  convergent methods, 202-21
  current exhibit entries, 80-101
  expense, 299-341
  function of, 3-5
  labor, 271-98
  material, 238-70
  opposition to, 16-24
  process production, 181-201
  purchases, 141-57, 247-53, 257-59
  specific order production, 158-80
  starting the General Exhibit, 65-79
Fixed assets, 59
Floating liabilities, 60
Foreman, opposition of, to factory accounting, 20-21
Functional organization, 26
  charting of, *insert between* 34 and 35, 38-39

General Business Record. *See* General Exhibit.
General Exhibit, 52
  closing of, *insert between* 76 and 77, 102-14, 340-41
  current entries in, *insert between* 66 and 67, 80-101
  starting of, 65-79
General manager, 37, 39
Going balance sheet, 65. *See* General Exhibit.
Gross income, 63
Guide lines, 71
Guide sheets, 49

Human
  element in organization, 13-24
  phase of assembling, 231

Idle time, 276-79
Impersonal accounts, 57
Imprest fund, 72, 115-21
Income, 63
Indirect expense, 304-5
Indirect production departments, 338-40
Industries, types of, 128, 222-37
Intangible assets, 59
Interim statements, 97-101
Inventory
  departmental, 190, 243
  of equipment, 194
  perpetual, 62-63, 244-47

Investment, 5-7
Invoices. *See* Purchases.

Job ticket, 260, 264, 277

Labor, 271-98
  classification of, 195-97
  Cost Summary, 86-87
  direct, 8-9
  point method, 207-12
  sold-hour plan, 203-7, 295
  See also Costs; Factory accounting.
Labor-percentage plan of expense diffusion, 305-10
Liabilities, 59-60, 77-79
  bonded, 59-60
  capital, 60
  deferred credits, 60, 108, 318-19
  floating, 60
Line control, 25
  charting of, *insert between* 30 and 31, 35-38
Liquid assets, 4, 58
List-percentage plan of expense diffusion, 314-15
Long and short leaf book, 62, 66-67
Loss and gain
  assigned to departments, 186-87
  does not cover nominal accounts, 58
  the index of efficiency, 11-12, 34

Machine
  numbers, 193, 195-97
  report, 197-98
Machine-hour plan, 203-7, 277-78, 295
  applied to expense, 313-14
Management
  channels, *insert between* 2 and 3
  opposition of, to factory accounting, 16-19
Man-hour plan of expense diffusion, 310-12
Manufacturing. *See* Production.
Mass products, 183-84
Material, 238-70
  audit of, 238-44
  bill of, 174, 266
  cost of, 8, 182, 238-70
  issuance cards, 150, 152, 156, 160, 261-66
  Ledger, 244-70
  point system, 209-12
  purchases of, 105-7, 247-53, 257-59
  used, report form for, 169
  various forms for, 267-70
  waste of, 238-44
  See also Costs; Factory accounting; Purchases.
Mechanical aids
  for the Production Register, 173-76
  for time records, 283-88
Mechanical phase of assembling, 232-33
Military organization, 25
  charting of, *insert between* 30 and 31, 35-38
Nominal accounts, 58, 60-63
Nonproductive time, 276-79, 289
Notes receivable, 72-73
Numbering of orders, 192-95

Opposition to factory accounting, 16-24

Digitized by Google

Orders, 9, 32, 39-42
  block system, 214-17
  budget system, 217-21
  charting routine of, 36, 42-45
  finished, 146, 259-61
  numbering of, 192-95
  purchase. *See* Purchases.
  rush, 213-14
  sheet system, 212-14
  specific, accounting for, 158-80
  tags for, 162-63, 166, 213, 265-66
Organization
  charts, 32-45
  committee, 27
  efficiency in, 27-31
  functional, 26, *insert between* 34 and 35, 38-39
  human element in, 13-24
  line, 25, *insert between* 30 and 31, 35-38
  military. *See* line.
  responsibility, 25-31
  staff. *See* functional.
  synthesis and analysis of, 1-12
  types of, 25-27
Overhead. *See* Expense.

Passive assets, 58-59, 75-77
Pay roll, 154, 288-95, *insert between* 300 and 301, 309
Period, closing, 61
Perpetual inventory, 62-63, 244-47
Personal accounts, 57
Physical audit, 238-44
Planning rack, 279-83, 285
Point method, 120, 207-12
Premium system, 295-98
Preparation, labor in, 196
Prerequisites to production, 1-4
Prices
  based on guessing, 3-4, 302
  based on standard costs, 191
Private Ledger, 49
Process
  Account, 184-87
  plan of expense diffusion, 315-16
  production, 181-201
Product
  forces resulting in, 9-10
  mass, 183-84
  standard grades of, 184, 229-30, 235-36
Production
  assembling 224, 229-37
    antecedent, 229-33
    reciprocal, 233-37
  continuous, 222-29
    analytic, 227-29
    synthetic, 225-27
  convergent methods of accounting for, 202-21
  cost, 62-63. *See also* Factory accounting.
  definition of, 1
  industries, types of, 222-37
  prerequisites of, 1-4
  process, 181-201
  Register, 87, 107, 164-80, 191-97
  specific order, 158-80
  summaries, 98, 104, 106, 110, 116-17, 197-201
  zones, 4-12
Product list numbers, 193-95
Profits, prospective, 5, 7. *See also* Loss and gain.
Purchases, 84, 105-7, 247-53, 257-59
  analysis of, 86, 136-37, 146-51
  antecedent records of, 141
  entries of, 151-57
  order form for, 138
  voucher system for, 142-46

Real accounts, 57-60
Receiving sheet, 267
Reciprocal assembling preparation, 233-37
Records, controlling. *See* Controlling records.
Representative assets, 59
Reserves. *See* Deferred Credits.
Responsibility, 25-31
Revenue, 63
Rush orders, 213-14

Sales
  expense of, 302-3, 324-25
  in the General Exhibit, 102-5
  manager, 11-12
  Summary, 87-88
Secured funds, 73
Sheet system, 212-14
Sold-hour plan, 203-7, 295
  applied to expense, 312-13
Specific order production, 158-80
Staff organization, 26, *insert between* 34 and 35, 38-39
Standard
  costs, 187-91
  grades of product, 184, 229-30, 235-36
Standing orders, 40
Starting the General Exhibit, 65-79
Stock
  Ledger, 130, 244-70
  report, 135, 243
Stores Ledger, 130, 244-70
Subsidiary records, 85-87. *See also under the various records named.*
Superintendent
  opposition of, to factory accounting, 19-20
Suspense items. *See* Deferred charges.
Synoptic. *See* General Exhibit.
Synthesis
  of organization, 1-12
Synthetic manufacturing, 225-27

Tests
  of standard costs, 188
Time
  keeper, 274, 281
  recorder, 273-76
  records, 8-9, 198, 203-7, 268, 271-97
  stamp card, 219, 222
  See also Factory accounting.
Traveling foreman, 118

"Utilitarian" cost, 186

Vice-president, 35
Voucher Register, 143-44
Voucher system, 142-46

Waste of material, 238-44
Workmen, opposition of, to factory accounting, 21-24
Works manager, 37-38

Zones of production, 4-12

Digitized by Google

Digitized by Google

Digitized by Google